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COMPUTERWORLD

INSIDE

Security Pacific nets Baxter exec

BY CLINTON WILDER
CW STAFF

LOS ANGELES — The volatile ranks of high-level information systems executives got another jolt last week as Security Pacific Automation Corp. tabbed Baxter International, Inc. IS chief Michael S. Heschel as its new chairman and chief executive officer.

Highly respected by his IS executive peers, Heschel has earned high marks for enhancing American Hospital Supply Corp.'s fabled ASAP order-entry system and successfully managing the combined systems after Baxter acquired AHS in 1985. Baxter was rated the most effective user of IS in its industry last year by the *Computerworld Premier 100.*

However, the Deerfield, Ill., medical products maker has gone through some tough times lately in a tight market, announcing forthcoming major cutbacks in headquarters staff, including IS (CW, March 5). The information resources department, which Heschel headed as corporate vice-president, was recently chopped from approximately 800 people to 500, said Jerry Fuller, an analyst at Duff & Phelps, Inc. in Chicago who follows Baxter. "They're taking his empire away," Fuller said of Heschel.


David Kagan

Heschel *moves into coveted top job at bank unit*

Heschel said that the cutbacks had nothing to do with his departure. "I've been through a lot of that in my time, but it's never had anything to do with career moves, at least not for me," he said. "I wasn't looking for a new job; this just happened to drop on me."

Heschel, 48, said the opportunity to run a for-profit IS business unit was a major reason he joined SPAC, one of the leading providers of processing services

Continued on page 16

An Wang left lasting mark on customers

BY MARYFRAN JOHNSON
CW STAFF

The last person Pat Cash expected to see that day in September 1988 was An Wang, already two years into semiretirement and receding into the shadows of his own company.

The MIS director for the Steel Hector & Davis law firm had come to the Lowell, Mass., headquarters of Wang Laboratories, Inc. for a demonstration of the Freestyle office imaging system.

Running the show and eager to trot out his pet project for the Miami lawyers was Wang, who was memorialized last week following his March 24 death from esophageal cancer (see story page 120).

"It just really sparked a life in him. It was his baby," Cash said, recalling her astonishment at such personal attention from the company founder.

Continued on page 120


Ken Wade Shevill

Lorraine Wang, *shown with the late An Wang and sons Fred and Courtney, was named Wang honorary chairperson. Page 97.*

Motorola '030 sales in jeopardy

Chip maker's clients urge quick settlement

BY JAMES DALY
and RICHARD PASTORE
CW STAFF

AUSTIN, Texas — A federal court judge threw a dagger at the heart of Motorola, Inc.'s microprocessor line last week when he ruled that the company must discontinue sales of its powerful 68030 because the chip's design infringes on patents held by Japan's Hitachi Ltd.

Friday afternoon, however, the ban on sales was lifted pending Motorola's appeal. The company also said it would seek a speedy resolution of its dispute with Hitachi, but the appeal may take several months.

Judge Lucius D. Bunton III ruled Thursday that Motorola would have to stop selling the 68030 as long as it continues to infringe on certain Hitachi patents. The 32-bit chip forms the computational engine of high-powered machines produced by Hewlett-Packard Co. and Sun Microsystems, Inc. and is central to Apple Computer, Inc.'s flagship Macintosh line.

However, the scales of justice swung both ways. As part of the decision, Judge Bunton also

Continued on page 118

High-tech boom opens security gaps

Last in a four-part series

BY MICHAEL ALEXANDER
CW STAFF

Corporate America is embracing technology as never before, putting personal computers into the hands of every white-collar worker and stitching computer systems into international networks.

Yet many information systems security experts fear that what may be good for business may be even better for computer outlaws and make it easier for them to commit new sorts of crimes.

Although technology has made many corporations more competitive, it has also made them more vulnerable to attack from employees and outsiders, said Dan White, partner and regional director of information security services at Ernst & Young.


David Flaherty

The rapid adoption of distributed systems, electronic data interchange, local-area networks and other technology has outpaced the capacity of most companies to secure them against attack, White said.

Telecommunications networks, especially those that cross international boundaries, are also more vulnerable to electronic industrial espionage, according to Noel Matchett, president of Information Security, Inc., a security consulting firm based in Silver Spring, Md.

"Every time valuable information is transmitted on unprotected circuits, there is the possibility it is being intercepted by competitors," Matchett said. "Frequently, transmissions are routed over satellite, microwave and even

Continued on page 119

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IN THIS ISSUE

Quotable

"I think he was always behind products with people in mind vs. the high-tech, whiz-bang technology. We were very touched by him."

PAT CASH
STEEL HECTOR & DAVIS

On An Wang.
See story page 1.

Spare the rod, get sued. Managers across the country are exposing their companies to potentially huge liabilities because they don't know how to discipline subordinates. So says a poll of 800 members of the American Productivity & Quality Center, which found that eight in 10 of those polled did not know that discrimination is unequal treatment of equals. Nice guys, beware: Juries are deciding that the most lenient means of discipline found in a company are the standards against which other means are measured should an employee sue. So be wary, be consistent and slide another coat of mink oil on that whip.

Alan Levenson

Louis Piper at General Dynamics aims for a tight fit between engineering and assembly. Page 79.

IS managers are facing a techno-storm greater than that of the '80s. Viewpoint, page 23.

EXECUTIVE BRIEFING

■ **The workstation and Apple Macintosh markets** are fearing for the future of the Motorola 68030 chip after a federal judge ordered Motorola to stop selling the flagship microprocessor. The judge ruled that Hitachi and Motorola both infringed each other's patents. However, the resulting order is potentially much more devastating to Motorola than Hitachi. Most observers say they believe that the chip makers will eventually reach an out-of-court agreement. **Page 1.**

■ **Reshaping the relationship between product design and manufacturing** is indicative of a new orientation in manufacturing toward "design for manufacturability." General Dynamics, Navistar and IBM are among manufacturers finding that the secret to rapid, high-quality production is in the design process rather than on the shop floor. Information systems can facilitate these links but must first bridge a communication gap that remains between it and the line. **Page 79.**

■ **A pending new Stratus recertification policy** has customers and third-party dealers and lessors up in arms. Stratus is reportedly about to dramatically raise charges for used CPUs to qualify for Stratus maintenance. Bell Atlantic Leasing, the nation's third-largest lessor, has frozen of its all dealings in Stratus equipment. **Page 4.**

■ **Baxter International's Michael Heschel** made a dramatic job change, taking over as chief executive officer of Security Pacific's successful information services business. The move represents a major career opportunity for Heschel, but it also comes amid significant cutbacks in IS and several other functions at Baxter headquarters. **Page 1.**

■ **Fears that Oracle's bubble has burst** rippled through the financial community as the high-flying database vendor reported virtually no profit growth in its most recent quarter. Oracle officials were quick to label the financial dip as an anomaly. **Page 4.**

■ **How can one executive manage** information systems at the nation's largest insurance company? He can't. Prudential Insurance's answer is to have two IS heads. Bill Friel and Michael Vitale take a team approach to tame Prudential's huge global networks and databases. **Page 55.**

■ **Apple's tree is still shaking,** and where the fruit will fall is a question of intense speculation. The organization appears torn between its brash upstart culture and the increasingly difficult demands of a softening and more competitive marketplace. **Page 93.**

■ **On-site this week:** Faster systems development for the fast-food business is the challenge in McDonald's financial systems group in Oak Brook, Ill., which has installed Syzygy project management software from Information Research. **Page 39.** Tracking what types of customers use your services is nothing new — except in the museum business. New York's South Street Seaport Museum has installed an Explorer Technology ticketing system to capture age and other information on its visitors. **Page 28.** The City of Minneapolis had a more urgent challenge: improving dispatch system response time on 911 emergency calls. It helped AT&T develop a Unix-based emergency system using AT&T's top-of-the-line 3B2 minicomputer, the Model 80. **Page 29.** Product lead times are vitally important to Mast Industries in Andover, Mass., which sources apparel for The Limited retail chain and its many subsidiaries. Mast uses an AT&T Accunet X.25 packet-switched wide-area network, MCI satellite links and T1 lines from both carriers to help deliver the goods. **Page 50.**

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Oracle's profit plunge: Anomaly, or reality?

BY NELL MARGOLIS
CW STAFF

BELMONT, Calif. — The dizzyingly high flight of Oracle Systems Corp. took at least a temporary dive last week when the software vendor, accustomed to double- or triple-digit earnings leaps, reported net income up a mere 1% for its recently closed third quarter.

The big question, analysts agreed, is whether the slim profits are an anomaly or writing on the wall. Oracle opted decisively for the former explanation; analysts were less certain. Investors, meanwhile, hammered the firm's stock down 6¾ points.

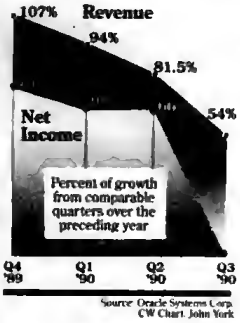
In a teleconference with Wall Street analysts, many reported, Chief Financial Officer Jeffrey Walker explained that $15 million worth of fourth-quarter sales had accidentally ended up on the third-quarter books. An eleventh-hour relocation of the figures into the right quarter tarnished the firm's historically glowing bottom line.

"We expect to make it up in the fourth quarter and get back on our annual plan," Chief Executive Officer Lawrence Ellison said in a prepared statement.

Analysts were not so sanguine. "This is sort of what everyone has been fearing," said Bruce Lupatkin, who follows Oracle at Hambrecht & Quist, Inc. in San Francisco. "For a long time, we've been hearing that slowing mainframe and minicomputer markets are not affecting the database people. Obviously, that's just not true."

Critical mass

Oracle's rapid growth appears to be taking a toll on the firm, as evidenced by the evaporation of profits during the last quarter



Source: Oracle Systems Corp.
CW Chart: John York

Ironically, Wall Street skepticism came not despite Oracle's insistence on the one-time-boo-boo theory, but largely because of it. "Right now, Oracle isn't suffering from any problems that can't be fixed," said Charlotte Walker, an analyst at Labe, Simpson & Co. "However, in order to fix them, Oracle has to accustom itself to slower growth."

The perils of runaway growth, the pitfalls of relying on pizzazz and the blindered view that market slowdowns only hit the other guys should all be common wisdom at software companies, said Robert Anderson, an analyst at Sutro & Co. "A look back at history — Cullinet, for one striking instance — tells me that Oracle isn't going to figure this out too quickly," he said.

Is the wild ride of the Belmont Bomber through? "Anybody's guess," said Robert Therrien, an analyst at Paine Webber, Inc. "But the negative cash flow they're now showing is a very bad sign." Added Lupatkin, "Having to borrow from banks to finance your receivables — and that's what Oracle is doing — is not a good way to run a business."

Stratus recertification move draws fire

BY MARYFRAN JOHNSON
CW STAFF

MARLBORO, Mass. — Stratus Computer, Inc. appears ready to enact a new policy expected to dramatically increase the cost to customers leasing or buying used Stratus machines, *Computerworld* has learned.

The firm is putting the final touches on a "recertification" policy for used equipment that is required to qualify for Stratus maintenance coverage. An estimated 3,200 Stratus systems have been installed since 1982.

While the policy is still unannounced, Stratus salespeople have informed several East Coast customers of the new rule, and the subsequent negative reactions are already affecting resale value of existing equipment.

Calling a halt

Initial accounts of the new policy prompted the third-largest leasing company in the U.S. to freeze all its business dealings with Stratus last week.

Customers contacting Bell Atlantic Systems Leasing last week were told, "We are no longer taking Stratus," said Chuck Kendle, product manager for the Los Angeles area office.

Several customers said they were told by Stratus sales representatives last week that the policy would do the following:

- Set up a new minimum charge of $1,500 when a Stratus field representative visits a customer site to certify a used machine for maintenance.
- Establish a hefty new pricing schedule for bringing individual components up to current revision levels, possibly requiring shipment to the Stratus factory in Marlboro.
- Double the cost of the VOS operating system from $24,000 to $50,000 for customers buying the system software to install in a used machine.

"The bottom line for me is that I've just lost half a million dollars," said Alan Pateman, manager of mainframe systems for Chicago Research and Trading.

Pateman is trying to unload a pair of 3-year-old XA2000 Model 120s, which originally cost more than $1 million each. "I've been dealing with a used broker out there who has a warehouse full of equipment that suddenly went to zero in value," he said.

Stratus officials last week would neither confirm nor deny the accounts that customers were hearing from Stratus employees. They did say, however, that customer complaints had prompted them to accelerate a final decision and official announcement of the policy.

Stratus currently has no policy covering recertification of used machines because the issue came up so rarely in the past that each case was handled individually.

"We simply want to start recovering some costs," said Rich Garrison, director of marketing operations at Stratus. "We also want to make sure we can maintain the Stratus machines that are purchased from others."

Others disagreed.

"The manufacturers have been paid handsomely to maintain the equipment for the user, and this kind of thing really cheats the original user," said Thomas J. Donovan, director of financial services for Technology Investment Strategies Corp. in Framingham, Mass.

One irate East Coast customer, who asked that his name not be used, said, "Customers like me work on the assumption that a leasing company will buy back our machines for resale. But if they can't resell it, they're not going to lease it."

Restrictive maintenance policies diminish the value of the computers on the used marketplace, while new purchases are likely to incur higher loan rates from banks who can no longer count on the computer tn be worth much if the business fails, Donovan said.

Ironically, a constriction in Stratus' leasing market could drive its customers to buy from IBM, which markets the Stratus box under its own label as a System/88, said Chris Duncan, president of Regal Computer Solutions in La Mirada, Calif.

"My [Stratus] business is in limbo at this point," said Duncan, who leases Stratus equipment and IBM System/88s. "I have one customer who wants to start talking to IBM. He's got a loaner machine from Stratus now, but he's been scrambling to find a leasing company."

Lease on life

In the $23 billion "aftermarket" for computer equipment, Stratus Computer, Inc. is too small to show up in statistics gathered by the Computer Dealers and Lessors Association (CDLA) in Washington, D.C.

In 1989, users spent $17.9 billion to lease new equipment and another $5.1 billion to buy or lease used equipment, said Doug McAllister, spokesman for the CDLA.

IBM equipment accounts for the lion's share at 71% of the overall leasing/used equipment market. Digital Equipment Corp. took a 7.2% share, and Amdahl Corp. garnered 7.1%.

Over the years, the CDLA has struggled with IBM, NCR Corp., Xerox Corp., Data General Corp., Bull H. N. Information Systems, Inc. and others over various restrictions affecting resale of equipment.

An infamous Bull maintenance policy, which required users to ship their machines back to the Phoenix factory for component upgrades, was withdrawn in February 1989 after prolonged outcry.

But the waters have been calm for a while now, resellers said last week. Companies such as IBM, DEC and Tandem Computers, Inc. have grudgingly recognized the value of a cooperative secondary market relationship.

Yet dealers remain painfully aware of the David-and-Goliath relationship with the manufacturers. "I'm the concession stand, and they're the ballpark," said George Trawinski, president of International Computer Exchange Ltd. in Boston. "I need them a lot more than they need me."

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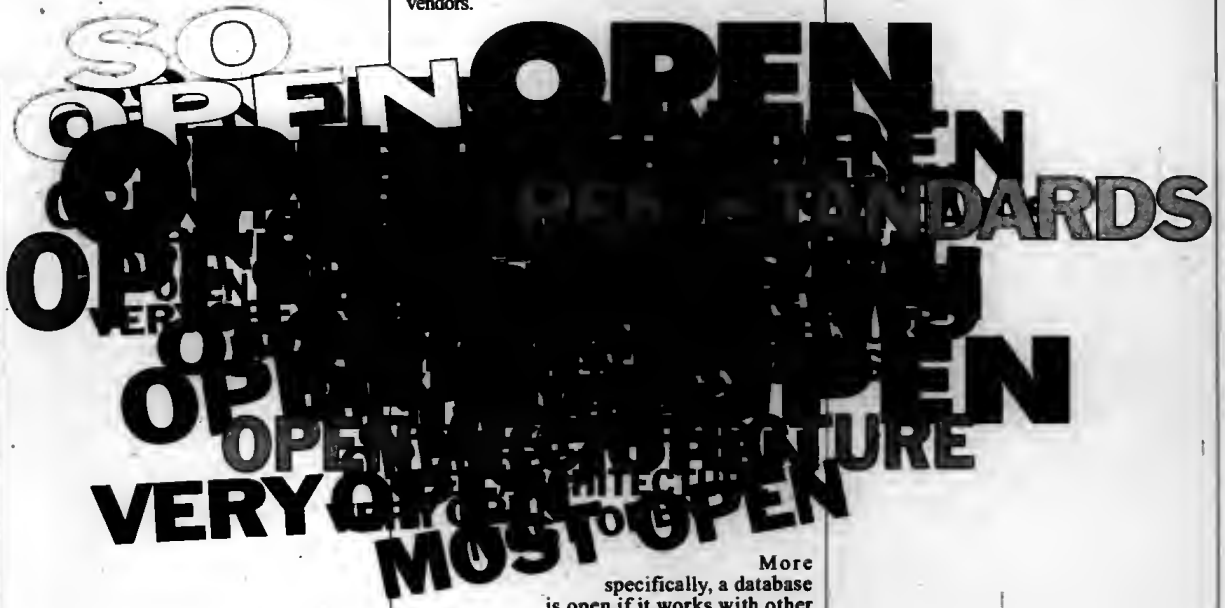

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Cray makes its minisuper move

Announces plans to buy Supertek, imminent debut of air-cooled Y-MP

BY ELLIS BOOKER
CW STAFF

MINNEAPOLIS — After years of debating about how best to enter the low end of the supercomputer marketplace, Cray Research, Inc. made its move last week, announcing an agreement in principle to acquire Supertek Computers, Inc.

Separately, Cray Chairman John A. Rollwagen hinted last week during a trade conference in Japan that the long-awaited, air-cooled version of Cray's Y-MP supercomputer will be available soon.

Supertek, a minisupercomputer maker in Santa Clara, Calif., makes the S-1, a minisupercomputer that is compatible with the Cray X-MP series. Analysts noted, however, that the privately held firm has had little success selling its machine, at least in part because Cray had refused to let it license its Unicos operating system.

In announcing the proposed acquisition, Cray said last week that it would port Unicos to the S-1 platform by the end of the year.

A Supertek spokesman said the company, formed in 1985, has about a dozen of its $250,000 minisupercomputers in the field and that half of these installations are purchased systems. The spokesman also confirmed that company founder and Chief Executive Officer Mike Fung is leaving.

Supertek's follow-up to the S-1, a machine compatible with the Cray Y-MP, will be ready in the second half of 1991, Cray announced.

Industry analysts unanimously praised the proposed acquisition. "It's a market segment Cray needs to be in, and this buys them quick market entry," said Patricia Laupheimer at Shearson Lehman Hutton, Inc. in New York.

"Cray has been toying with the entry-level strategy for a number of years, and they've finally made a decision how to do it," said Gary Smaby, an analyst and managing director at Needham & Co. in Minneapolis.

Laupheimer and other observers also said Cray was obviously looking to cultivate future customers for its large-scale machines, as well as protect itself from the likes of Richardson, Texas-based Convex Computer Corp.

Along with high-performance workstation companies, Convex has made significant inroads on the low end of the high-power computing market.

A Cray spokesman last week confirmed reports that an air-cooled single-processor Y-MP could be shipping by the end of the year.

He said the as-yet-unnamed platform would cost between $2 million and $5 million.

Users also welcomed the entry-level supercomputer plan.

"I've have always felt an entry-level system from a manufacturer is an appropriate marketing strategy," said Walter McRae, interim director of the university computing and networking services at the University of Georgia in Athens.

McRae recalled that an air-cooled version of the Cray Y-MP has been discussed for some time. "We've been advised about a debate within the company" over it, he said. He noted that the low-end machine would increase Cray's user base and potentially align some of these customers for Cray's larger systems.

However, Convex Vice-President of Marketing Frank Vince noted that Cray must still address pricing and support structures for the low end of the market and that it must figure out how to make the architecture used on its $20 million machines compatible with the entry-level systems.

"Every company that has tried to take a large architecture and adapt it to a more-cost effective package has had difficulties," he said.

Terms of the proposed cash acquisition were not disclosed, and the agreement is still subject to government approval.

New market

With its purchase of Supertek, Cray Research is entering a minisupercomputer market led by Convex and Alliant

	1st shipment	Total units shipped through Dec. '89
Alliant	1985	540
BBN Systems	1986	195
Convex	1985	705
Elxsi	1983	125
Intel	1985	250
Multiflow	1987	100
Thinking Machines	1986	55

Source: Electronic Trend Publications — CW Chart: Doreen Dahle

U.S.-Japan supercomputer pact debated

BY GARY H. ANTHES
CW STAFF

Despite skepticism that it will resolve long-simmering trade disputes, U.S. officials stoutly maintained last week that a draft agreement just reached with Japan will open Japanese public-sector markets to U.S. supercomputer makers.

According to an official at the office of the U.S. Trade Representative (USTR), Japan agreed to block supercomputer bids made at unrealistic discounts, which have ranged as high as 80%. The official, who helped negotiate the deal, said Japan also promised to buy supers on the basis of performance as well as price and to curb the use of artificial benchmarks crafted to show off Japanese machines at an unfair advantage.

Paul Miller, chairman of Supercomputer Systems, Inc., the IBM-backed firm launched in 1987 by supercomputer designer Steve Chen, seemed unimpressed. "In the past," he said, "it hasn't made much difference what [the Japanese] say they'll do. When push comes to shove, they'll do what they want."

The USTR official, who asked not to be named, disagreed, saying the pact contains a well-established procedure by which U.S. complaints can be brought to an office within the Japanese Prime Ministry.

"It is too early to say whether or not this will resolve the 301 case initiated last year," said U.S. trade representative Carla Hills in a written statement.

Under terms of the so-called Super 301 clause of the 1988 Trade Act, the Bush administration has said it may boost tariffs on selected Japanese products if Japan fails to open its markets to several named industries, including supercomputers.

Testing, testing

In the short term, the official said, a test of the agreement will come from three impending supercomputer buys — two from Japanese universities and one from a scientific institute.

Supercomputer market leader Cray Research, Inc. had little comment on the tentative agreement, saying it would not count its Japanese sales until they are hatched. "Will it make a difference? It depends on whether or not we sell any supercomputers," a spokeswoman for the Minneapolis-based firm said. Cray has sold 23 supercomputers to Japan, nearly all to private-sector customers.

The agreement applies to computers with a theoretical peak performance above 300 million floating-point operations per second (MFLOPS). That would include the recent offerings from Cray Research, supercomputers under development at SSI and at Cray Research spin-off Cray Computer, Inc., as well as several highly parallel machines from Thinking Machines, Inc., Intel Scientific Computers, Inc. and others.

The trade official said there is no connection between the 300-MFLOPS threshold and the U.S. Commerce Department's recent proposal to define a supercomputer for the purposes of export control as anything with a peak speed above 100 MFLOPS. Industry members complained that the 100-MFLOPS definition and additional cut-offs at 150 MFLOPS and 300 MFLOPS would restrict export of too many machines. The Commerce Department is considering a new proposal [CW, Feb. 5].

Private enterprises in Japan have preferred U.S. supercomputers for some time. However, Japanese universities — which are typically offered huge discounts by domestic producers — and government agencies have avoided Cray in droves.

Jeffrey Canin, an independent computer analyst based in San Francisco, estimated the Japanese supercomputer market at $200 million to $250 million and growing at up to 40% annually.

Multiflow's swift demise leaves details lacking

BY SALLY CUSACK
CW STAFF

BRANFORD, Conn. — With a resounding clang, minisupercomputer maker Multiflow Computer Corp. closed its doors last week in a surprise shutdown that left about 160 people unemployed and 100 user installations fumbling in the dark.

"We aren't clear on what all the details are," said Jim Lamoin, director of information management at Sikorsky Aircraft in Stratford, Conn. Sikorsky, a division of United Technologies Corp., has been using a Multiflow Trace computer for scientific applications. Lamoin said Sikorsky will be looking for alternative suppliers.

The company's failure was a shock to many, especially in light of recent announcements hinting at an upcoming contract with a major computer vendor. John Eckdahl, Multiflow's chairman and chief executive officer, reportedly indicated that the deal fell through, resulting in a board decision to liquidate.

Couldn't hook up

Multiflow, in the red since it entered the market in 1987, made unsuccessful merger bids last year with Adage, Inc. and General Business Investment Corp.

"It's unfortunate," said Christopher Willard, an industry analyst at Dataquest, Inc., a San Jose, Calif.-based market research firm. "The company had a good group of people and an interesting product."

Multiflow entered the scientific computer market with its Trace computer series — a family of Unix-based systems that use very long instruction word architecture and a compacting compiler technology. This approach reportedly allows a Trace machine to execute as many as 28 simultaneous instructions per machine cycle.

"The technology was good; they put tremendous effort into software, but they needed to duplicate that on the hardware side," said George Weiss, an industry analyst at Gartner Group, Inc., a market research and consulting firm in Stamford, Conn.

The scientific computing arena has seen several casualties during the past few years, including Scientific Computer Systems Corp. in San Diego; St. Paul, Minn.-based ETA Systems, Inc.; and Elxsi, formerly in San Jose. The fallout has left a few supermini vendors standing, chiefly Convex Computer Corp. in Richardson, Texas, and Alliant Computer Systems, in Littleton, Mass. Last week's Cray Research, Inc. buyout of Supertek Computers, Inc. may provide new competition, Willard said.

"Multiflow never really delivered a dramatic performance — certainly not enough to grab market attention," Weiss said. "They had tremendous potential — parallel processing with a compiler — but they were slow in CPU clock speeds, and it took them a while to get the compiler to execute 28 simultaneous operations. Convex has a more aggressive sales force, a more sophisticated hardware platform and had more software ported earlier in the game."

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NEWS SHORTS

Security risks

European corporations lost an estimated $10 billion in 1987 as a result of poor information systems security practices, according to a report by Frost & Sullivan, Inc., a market research firm. About half of those losses can be attributed to deliberate fraud, while the rest come from accidental system failure and the loss or corruption of data, the firm reported. The proliferation of personal computers and the increased use of networked systems will only compound the problem, Frost & Sullivan said, and as businesses become more dependent on information technology, it is likely that losses will climb at about 9% per year. The firm said that security will become a major issue in 1992 and beyond, when most European countries will do away with economic borders. As a result, the market for security products is expected to grow from $794 million in 1987 to $2.4 billion in 1993.

Kodak to supply IBM

Eastman Kodak Co. said last week it will supply the image application software for the IBM Personal System/2 portion of IBM's Imageplus system. The Kodak software was designed to help users index, search for, view and distribute images of documents stored on magnetic or optical media.

Feds reduce claims against NBI

NBI, Inc., an office automation software company, announced that the U.S. Department of Justice has filed an amended complaint against the company, significantly reducing a claim made by the government last year on allegations that NBI overcharged the government for products during 1984, 1985 and 1986. The Justice Department was originally seeking $6.6 million in damages; $2.2 million in alleged overcharging plus triple damages, according to NBI. The department removed its claims for 1985 and 1986, totaling about $1.76 million.

Mastercard tests radio links

Mastercard International announced last week that it has completed a pilot program involving credit card authorization and check guarantee requests using radio, rather than a dedicated telecommunications service, as the media. The program was conducted with Digital Radio Network's radio service by Mastercard Automated Point-of-Sale Program at Herman's Sporting Goods, Inc. stores in California and Virginia. The service consists of a radio transmitter/receiver that provides a link to the company's telecommunications network, which in turn delivers the transaction via a link into Banknet, Mastercard's private packet-switching network, for a response to the merchant within about five seconds.

Gigabaud?

Fujitsu Ltd. said last week its mainframes and supercomputers will support a 1G bit/sec. channel-based network from Ultra Network Technologies. The two companies, along with Ultranet's Japanese distributor, Tokyo Electron Ltd., entered an agreement to market Ultranet on Fujitsu computers worldwide. Availability of Ultranet for Fujitsu's Unix-like UTS/M operating system is slated for fourth quarter, with Ultranet for OSIV/MSP, Fujitsu's equivalent of IBM's MVS, scheduled to ship in the first half of 1991. Ultra Network recently announced Ultranet BMCop Adapter, which is said to increase IBM mainframe I/O performance to up to 36M byte/sec.

Compaq adds EISA controller

Seeking to spawn a supply of networking peripherals designed to reap the full advantage of the Extended Industry Standard Architecture, Compaq Computer Corp. is expected to announce plans today to ship its first 32-bit controller for IBM Token-Ring networks. In benchmark tests, the Dualspeed Token-Ring Controller yielded data transfer rates 32% faster than an IBM Token-Ring Network 16/4 Adapter/A controller, Compaq claimed.

More news shorts on page 118

Talk of splitting OS/2 team

BY CHARLES VON SIMSON
CW STAFF

SAN DIEGO — A senior IBM executive last week would not rule out the possibility that the company would cede OS/2 Standard Edition development to Microsoft Corp. Officially, however, the senior OS/2 executives at both IBM and Microsoft denied reports that such a transition has happened or is planned.

Fernand Sarrat, general manager of IBM's Desktop Software Group, an applications development group not directly responsible for OS/2, said in a conversation with reporters that while no transition had happened, the relationship between the two companies was a "constant evolution," and a redeployment of development resources was not an unrealistic scenario.

"It is not true today, but if I were you, I wouldn't take my eye off the ball on this story," Sarrat told reporters who approached him at the Software Publishers Association conference here.

Executives at IBM and Microsoft maintained that while there is always discussion of ways to enhance the relationship between the two companies, no basic change in the deployment of development resources is planned.

"There are no plans for IBM to abdicate OS/2 development," said Lee Reiswig, vice-president of programming at IBM's Entry Systems Division and IBM's chief OS/2 executive. "I don't think that would ever make sense."

"If we did the development as one company, I don't think we would do it much differently," said Peter Neupert, senior general manager of OS/2 at Microsoft. "There is always discussion of change, but no basic redeployment."

Technical oversight

For the last several weeks, rumors have been circulating that IBM had already begun to transfer all OS/2 Standard Edition development to Microsoft while maintaining an oversight role in the technical direction.

At the same time, IBM reportedly would maintain development of OS/2 Extended Edition, its value-added OS/2 product.

Almost since the introduction of OS/2, critics have charged that sharing of the operating systems' development process was unwieldy, something that IBM and Microsoft executives have periodically acknowledged.

"I think a consolidation would make sense," said Michele Preston, a software analyst at Salomon Brothers, Inc. in New York. "The process has become so large, it is difficult to maintain a focus. That is not the way the best software is developed."

In that vein, Sarrat did say that, in the interest of managing the complexity of OS/2 development, it might make sense to reduce the number of sites working on the software.

Development currently takes place in four locations: IBM development sites in Hursley, England, Boca Raton, Fla., and Austin, Texas, as well as at Microsoft headquarters in Redmond, Wash.

Sarrat said IBM did not want to simply become an OEM of Standard Edition, having spent large sums of money developing it. He acknowledged, however, that, short of complete abdication, there were many avenues IBM could pursue in maintaining architectural oversight and revenue from licensing while getting out of the day-to-day development of code.

Sarrat also said that developers at Boca Raton had already begun turning their focus away from OS/2 and toward more applications, including multimedia, and work directed specifically at IBM's Personal System/2 line of personal computers. He stressed, however, that OS/2 coding was still going on at all IBM facilities.

Apple zaps clone makers in Taiwan

BY JAMES DALY
CW STAFF

CUPERTINO, Calif. — Apple Computer, Inc. has taken its zero-tolerance view of clone makers overseas and filed criminal complaints against two Taiwanese manufacturers that allegedly copied its Macintosh personal computer.

Taipei police raided the offices of the firms after Apple filed charges against five Taiwanese businessmen on grounds that they produced illegal copies of the Macintosh Plus.

The indictments against officials at Five Computer Corp. and Akkord Technology, Inc. is the latest evidence of Apple's long-standing vow to doggedly pursue those who tread on its copyrights and trademarks. "It is not only in our own interest but in the interest of the public and the computer industry that there be effective protection of copyright and other intellectual property," said Apple Pacific President Ian Diery.

Apple officials said that they had known for about 18 months that Five had supplied Akkord with a clone of the Macintosh Plus.

"They were quite brazen in their advertisements," said Apple spokesperson Pam Miracle. The machines were then sold by telephone and mail order in Taiwan, Hong Kong, Australia and Singapore and even reportedly exhibited behind closed doors at the Hannover Faire in West Germany and at Comdex in the U.S., Miracle added.

The complaints were filed following several months of investigation and after the individuals refused to comply with Apple's written request that they cease production of the clones. Apple officials would not release the identity of those named in the complaint.

Apple has a long history of aggressively pursuing clone makers. As long ago as 1984, Apple went after Franklin Computer Corp. for allegedly copying Apple's operating system and assorted software applications. The Cherry Hill, N.J.-based vendor subsequently paid Apple $2.5 million in order to settle the dispute.

Recently, Apple has brought copyright infringement charges against both Microsoft Corp. and Hewlett-Packard Co.

Lattisnet adds Token-Ring

MOUNTAIN VIEW, Calif. — The addition of IBM Token-Ring connectivity to the Synoptics Communications, Inc. concentrator product line is intended to fill what it considers a critical marketing hole for the local-area network firm.

Synoptics announced shipment of Token-Ring modules for its Lattisnet System 3000 concentrators. The company already has one of the most spectacular growth rates in the industry, based primarily on its Ethernet concentrators. With this introduction, Synoptics addresses mixed Ethernet/Token-Ring environments.

The concentrator, an intelligent wiring hub, will manage the physical layer of Token-Ring networks. The System 3000 does not allow for direct Token-Ring-Ethernet communication.

Synoptics brought out System 3000 last May, announcing plans to add Token-Ring and Fiber Distributed Data Interface connectivity.

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Relational performances scrutinized at DB Expo

BY JEAN S. BOZMAN
CW STAFF

SAN FRANCISCO — Performance was very much on the mind of those participating in DB Expo '90, the National Database Exposition and Conference held last week.

The performance of relational database management systems — from IBM's DB2 to Digital Equipment Corp.'s RDB to RDBMSs made by Ingres Corp., Sybase, Inc., Oracle Systems Corp. and Informix Software, Inc. — were all subjected to questioning by users and consultants alike.

IBM's DB2, with 5,000 licenses worldwide, appears to be doing better than in the past in terms of performance, according to users from large corporations.

"Many users are now happy with DB2's performance in production," said Linda Garcia-Rose, coordinator for New York's Knauer DB2 Users' Group. "It's cranking up. But people know it's a not s high-volume system for critical high-transaction applications."

IBM said its testing of DB2 Version 2.2 showed transaction rates in excess of 250 per second, compared with rates of 182 per second for DB2 Version 2.1.

Most of New York's major banks — and most of its brokerage houses — use DB2 in production systems, Garcia-Rose said. Surveys from her user group of 300 user sites indicated that 75% have DB2 in production, compared with 40% just two years ago. Applications include cash management, personnel systems and information center query by end users.

Other vendors' RDBMSs did not escape the glare of scrutiny. One seminar focused on benchmarking techniques developed by the California-based Transaction Processing Council (TPC). So far, only Hewlett-Packard Co. has released its TPC benchmark results, but other vendors are expected to do so by midyear.

A previous generation of TPC benchmarks was faulted by vendors and analysts for being too limited because it tested debits and credits instead of simulating real-life work loads. The new TPC benchmarks have been cited as an improvement, even though local-area network server vendors such as Sybase object that it is difficult to simulate client/server performance with the TPC specifications.

The TPC benchmarks may force some amendments to the current spate of mudslinging advertisements paid for by many of the major RDBMS players, analysts said. "Vendor claims based on TPC benchmarks will require a full disclosure statement," said Omri Serlin, president of Itom International, Inc. and chairman of the TPC group.

Further clouding the issue is the phenomenon of converging performance levels among the major RDBMS suppliers. "Conventional hardware systems are in striking distance of hitting their maximum amount of throughput using any of the major RDBMS systems," said Ken Jacobs, vice-president of research at Oracle. "You won't see any real breakthroughs in I/O and overall performance until the software vendors start putting their systems on massively parallel machines."

Some dedicated DBMS machines, including Teradata Corp.'s DBC 1012 processor and Charles River Data Systems' Relational Accelerator, which is being used by Oracle, achieve high levels of throughput by avoiding the use of general-purpose operating systems.

However, the differences between RDBMS brand names are often based as much on features and functions as they are on raw horsepower, vendors and analysts agreed. "The difficult thing is to see the performance numbers come out and not to be fooled by them," said Gordon Smith, a senior product manager at Oracle.

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Hitachi cozying up to MVS/ESA

Giving its mainframes some of the features of IBM's MVS/ESA operating system, Hitachi Ltd. is offering s new version of its proprietary operating system aimed at the Japanese market.

The operating system, VOS3/AS (Virtual Storage Operating System 3/Advanced System Product), will be available on most of Hitachi's mainframes.

While targeted at the Japanese market, where the IBM operating system is not widely used, Hitachi may bring it to the U.S., according to a company spokesman. There are currently s handful of Hitachi mainframes with the company's proprietary operating system here. They are used by Japanese companies with American branches to provide compatibility to companies' mainframes in Japan, according to the spokesman.

A decision to bring the new operating system to the U.S. has not been made, he said.

Analyst Peter Burris at International Data Corp. in Framingham, Mass., discounted the importance of the new operating system to the U.S. market: "Any notion that there will be a major-league competition for operating system software is hokey, hooey and hogwash."

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Ameritech joins net management game

Phone company branches out with ANM, a set of consulting services and technology tools

BY ELLIS BOOKER
CW STAFF

Reasoning that a phone company with 12 million customers knows something about network management, Chicago-based Ameritech last week entered the enterprise network management business.

The $9.9 billion regional Bell holding company's subsidiary, Ameritech Information Systems, announced Ameritech Network Management (ANM), a combination of consulting services and technology tools that mirror the Open Systems Interconnect (OSI) model.

At a briefing last week, officials said the mission to offer network management solutions to the outside world grew out of the 1-year-old group's success in providing integration technologies to Ameritech's internal operations.

Indeed, the only one of the five ANM customers described at the briefing to be identified by name was Ameritech Applied Technologies, the information systems arm of Ameritech and the phone companies in its five-state region.

"We found that building network management solutions was a very natural extension of our daily business," said Ameritech Information Systems President and Chief Executive Officer Roger Plummer.

The job of controlling networks today is more, not less, complicated because of a proliferation of separate component management systems, he said.

Plummer also stressed Ameritech's vendor independence and argued that it is therefore free to choose the best of available hardware and software. Like other phone companies, Ameritech is prohibited from manufacturing hardware and certain kinds of software under the Modified Final Judgment that split up the Bell System in 1984.

Ameritech's Plummer *emphasizes independence*

Two weeks ago, Ameritech disclosed a five-year plan to consolidate the number of data centers in its territory from 14 to four and link them over a private, high-speed network as part of an effort to reduce data processing costs by 20%.

The network, dubbed the Ameritech Intelligent Corporate Network (AICN), will use ANM to consolidate dozens of existing element management systems, including IBM Systems Network Architecture, Ethernet and a 16-node T1 backbone network.

"We hope to use ANM as the umbrella," said Kenneth P. Hochsprung, director of AICN planning and support. Behind this graphical user interface, he said, will be a abundance of component network management systems as well as IBM's Netview.

Ameritech said an interface to the Simple Network Management Protocol of Transmission Control Protocol/Internet Protocol will be finished by the end of the year and that an interface into AT&T's Unified Network Management Architecture (UNMA) will be developed as well.

Analysts said it is significant that Ameritech will use its own network management scheme to handle its internal network. However, they wondered how the market would bear yet another effort to develop an "umbrella" element management system and how well Ameritech would be able to compete on a national scale.

"AT&T isn't using UNMA to run their own stuff," noted Jill Huntington-Lee, an analyst at Datapro Research Corp. in Delran, N.J. She said Ameritech has to prove, however, that its scheme is "applicable to a non-telecom environment."

Ameritech Information Systems certainly hopes to leverage its existing installed base of customers for the network management product. For example, it said that work is under way to have ANM treat the Ameritech Service Management System as a network element, which Ameritech's regulated phone companies announced last November. The enhanced Centrex enables users to monitor their Centrex services.

AMERITECH WILL use its own network management scheme to handle its internal network.

Ameritech Information Systems said its ANM already contains 102 interfaces to elements and element management systems. Ameritech said that by the end of the year, it will have an object-oriented programming tool to enable end users to build their own interfaces.

Ameritech Information Systems has teamed with several established network management companies over the past year to develop its ANM tools.

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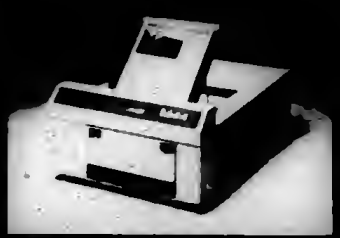
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Codex links 9800 to Netview

BY JOANIE M. WEXLER
CW STAFF

Interoperability among network management systems took a step closer to reality last week when Codex Corp. announced an open systems version of its 9800 Integrated Network Management System.

The announcement jibes with the company's stated intentions for the product at its initial rollout in 1987, when the system was equipped to manage just Codex multiplexers.

Release 3 includes a bidirectional link into Netview, IBM's enterprise system for managing Systems Network Architecture networks, and Codex will reportedly offer interfaces for Digital Equipment Corp.'s Enterprise Management Architecture and Open Systems Interconnect (OSI) network management systems as those develop. The 9800's Netview link allows information from the 9800 to be sent to Netview, as well as commands from Netview to be passed through the 9800. Operators at the 9800 console can reportedly use 3279 emulation to view Netview information through a window.

"For Codex, the link to Netview is a necessary marketing step for survival in a 'manager of managers' world," noted Steven A. Taylor, president of Distributed Networking Associates, a consultancy in Greensboro, N.C.

He added that interoperability among vendor-specific and enterprisewide network managers — which is a current goal of the OSI/Network Management Forum — "is a good compromise" because it frees users from single-vendor solutions, yet gives vendors the ability to differentiate themselves based on how much network management they build into their products.

The IBM service point is built into the 9800, reportedly eliminating the need for Netview/PC, IBM's interface for managing non-IBM devices using Netview.

"This feature removes the clutter of multiple PCs hanging off the front end and removes those potential points of failure," said Frank Dzubeck, president of Communications Network Architects, Inc., a consultancy in Washington, D.C.

Release 3 expands on the concept of an "elemental" network management system — which manages one technology — to that of a "domain" manager for collecting and integrating data from several technologies.

Priced at $47,000 for a stripped-down version, the system now manages the company's own T1 switches, X.25 packet switches, bridges, modems and other devices in a wide-area network (WAN), as well as devices developed by other vendors and resold by Codex, such as the 6290 and 6292 "fast packet" switches from Stratacom, Inc. and the 6262 T1 channel service unit from Kentrox Industries, Inc.

Codex said that it is amenable to building 9800 management hooks into non-Codex-based products for customers needing other WAN technologies to be managed by the system. Non-Codex-based products without the hooks would still have to be managed by their vendors' element management systems.

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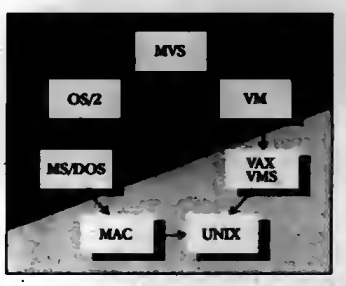

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Tymnet's UK parent casts net

Concert net management system may encounter tough audience

BY ELISABETH HORWITT
CW STAFF

NEW YORK — While British Telecommunications PLC's Concert may not play in Peoria, or even New York, the international carrier's integrated network management strategy may find a receptive audience among multinational corporations whose global networks need managing.

"Everyone and his brother wants to get into network management," said John Payne, a telecommunications analyst at Charles Schwab & Co. With other carriers' Open Systems Interconnect (OSI) compliance around the corner, BT's claim that its product will conform first is "no big deal."

"British Telecom has to bring to the table a nice, long-term vision or else it's just another network management system that will sell to a few shops that are dominated by [BT subsidiary] Tymnet," Payne said. Schwab's own long-term strategy requires a system that can manage not only the corporatewide network but also a distributed processing architecture now being designed, he said.

"I think I would look closely at AT&T's UNMA [Unified Network Management Architecture] for a short-term solution — say for 36 months to five years, because it knows real-world transport problems," Payne said.

On the other hand, UK power utility Powergen PLC is distinctly interested in Concert. It is "the first product we're aware of that can bring various network tools under one management system," said Jeff Jones, the company's telecommunications services manager.

IBM's Netview, for example, cannot manage Powergen's mix of network equipment, which includes Timeplex, Inc. T1 switches, Novell, Inc. local-area networks and a raft of telecommunications equipment; nor has Powergen seen a convincing demonstration of integrated management from anyone else from across the Atlantic, Jones said.

"Extremely useful" to Powergen will be Concert's promised ability to monitor and troubleshoot intersite connections on BT's Megastream network service, Jones said. Right now, "we just learn that we lost communications to a site," not whether Megastream is the source of the fault. BT has also promised customers the ability to configure its network circuits through Concert, hopefully by next year.

Opening doors

This "opening up of its network for customer twiddling" on BT's part could help foster openness on the part of other European carriers, which have lagged behind U.S. carriers in that regard, said James Herman, president of Northeast Consulting Resources, Inc. in Boston.

"I would look to BT as someone who might provide the interfaces and alliances to open up management of European-based networks," as well as to provide management across both U.S. and European systems, Herman said. BT Tymnet faces a battle with Infonet, which is pursuing a similar strategy through its recently announced alliance with Digital Equipment Corp., he said.

Initial Concert products will include a management workstation that will run on Sun Microsystems, Inc. systems; an Oracle-based management information base; and basic monitoring, performance and configuration management functions. Phased introductions will add other areas of management functionality, according to Graham Stanton, senior product manager at BT.

Security Pacific

CONTINUED FROM PAGE 1

to other banks. "I wasn't interested in another CIO position with an industrial company," Heschel said. "This is a good shot in a new industry that positions me very nicely for the rest of my working life. [Security Pacific Automation is] a hell of a good institution."

The SPAC chairmanship may be one of the most coveted posts in IS, judging from the track records of Heschel's two immediate predecessors.

John P. Singleton, to whom Heschel will report, was promoted to chief operating officer of SPAC parent Security Pacific Corp. in January [CW, Jan. 29], and previous SPAC Chairman DuWayne J. Peterson currently earns $1 million compensation as IS chief at Merrill Lynch & Co. in New York.

Heschel may also be receiving a healthy salary increase with the move. Recent *Computerworld* research estimated Singleton's total compensation for the job in 1988 at between $450,000 and $550,000, while Heschel's estimated compensation in the same year at Baxter was in the $250,000 to $350,000 range [CW, Jan. 15].

Heschel has been wooed by other companies, including financial services firms, during his time at Baxter, said M. Victor Janulaitis, an IS consultant who has known Heschel for 15 years. "A number of organizations have made runs at him, but none of them clicked," said Janulaitis, who is president of Positive Support Review, based here. "This is the perfect job for Mike, and his personality will mesh with Singleton's. It's a good, good fit."

Criss-cross

Heschel's jump from manufacturing to financial services is the latest of several recent cross-industry job changes by top IS executives. These included the move of William Sitter from Northwest Airlines to Allstate Insurance Co., John Hammitt from Pillsbury Corp. to United Technologies Corp. and Colin Crook from Data General Corp. to Citicorp. Such moves seem to be increasing, despite the paramount importance of business understanding within IS.

"I think the ability to apply technology to the business is 80% transferable between industries," Heschel said. "If you can bring a fresh outlook to the business environment, you can be a very valuable asset to the company."

Heschel will start at SPAC one week from today. Baxter has not named a replacement, but an announcement could come as early as this week, Heschel said.

"Their solution might eventually be to break the job up or perhaps decentralize the function," said Janulaitis, who was a consultant to Baxter after the AHS acquisition. "If they bring someone in from outside, he'll have to be Superman to survive more than 18 to 24 months in a company going through that kind of change. I've seen it happen elsewhere."

The move to SPAC represents a homecoming of sorts for Heschel, who spent most of his life in California before moving to the Chicago area in the 1980s. He joined AHS' American McGaw Laboratories in Irvine, Calif. in 1976 as director of management science and IS.

On-Line Software snaps up former Pansophic president

BY ROBERT MORAN
CW STAFF

FORT LEE, N.J. — On-Line Software International, Inc. announced last week that William Nelson has been named president and chief operating officer, a position he has held at Pansophic Systems, Inc. since February 1984.

On-Line returned to profitability and posted 9% revenue increases in both the second and third quarters of 1989 compared with the same quarters in 1988 under the command of Peter Boni, whose short tenure in the post started in August 1989.

"I want more aggressive growth in the company," said Jack Berdy, chairman and chief executive officer of the company and a first-year medical student at George Washington University in Washington, D.C. "In order to maximize profits, we need somebody who has the talent and experience building a strong sales machine."

According to Berdy, Nelson took Pansophic's revenue from $43 million to $200 million by building a sales machine. "Bill did that in approximately seven years, which matches what I desire for On-Line," Berdy said.

Nelson, 55, joined Pansophic Systems in August 1983 as executive vice-president of North American operations. In February 1984, he was elected president and COO. In August of the same year, he was elected director.

Berdy said that Boni guided the company to acceptable growth but that Nelson represents "a different level of talent." Neither Boni or Nelson could be reached for comment.

According to On-Line, Boni will return to Potential Dynamics, a Boston-based management consultancy specializing in turning around financially troubled firms.

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Huntsville 4/18

ARKANSAS
Little Rock 4/4

ARIZONA
Phoenix 4/26

CALIFORNIA
Long Beach 5/8
Los Angeles 5/3*
Sacramento 4/4
San Diego 5/15
San Fernando Valley 5/1
San Francisco 3/7
San Francisco 4/19*
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Colorado Springs 4/11
Denver 4/12

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Washington, DC 4/25*
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Atlanta 5/24

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Des Moines 3/21

ILLINOIS
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Chicago DEC Ctr. 4/5
Chicago 4/17
Chicago 4/26*

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Indianapolis 3/28

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Kansas City 3/27

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Cincinnati 5/10
Cleveland 4/11
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Valley Forge 6/12

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Nashville 4/10

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Austin 4/5
Dallas 4/18
Dallas 5/2*
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Houston 4/4*
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ADVANCED TECHNOLOGY

TECH TALK

"The computer is a multidimensional phonograph," according to Stan Coryn, president of Warner New Media. The company has introduced Mozart's *The Magic Flute* on a compact disc/read-only memory (CD-ROM) three-disc set for the Apple Computer, Inc. Macintosh. The CD-ROM set, the first from the company, contains 7,000 screens of information and 143 minutes of digital audio. The discs also contain an Apple Hypercard stack with music commentary, narration, educational examples and other information. Suggested retail cost is $66.

Intel Corp. and IBM have introduced two digital video interactive (DVI) personal computer-compatible boards, the first under a joint pact signed last year. Intel's DVI technology makes it possible to store and play back full-motion video, audio, graphics and text on PCs equipped with Intel 80386 microprocessors. Intel plans to sell both a 16-bit IBM Personal Computer AT and 32-bit Micro Channel Architecture (MCA) version of the boards; IBM will market an MCA version. Both will list for $1,995 and be available in the next quarter, the companies said.

The nation's peanut farmers limit the size of their harvests each year under a federal price-support program that guarantees the price of every pound of peanuts harvested. The U.S. Department of Agriculture, which used to record peanut sales on paper, is readying itself to issue 30,000 smart cards to peanut farmers that will make it possible to automatically track peanut poundage and sales. The smart cards, about the same size as a credit card, contain microprocessors that are capable of storing data. The Peanut Buying Point Automation System will be the largest smart card application currently in operation, according to Applied Systems Institute, which has the contract to supply the cards.

Redesigning the office of the future

Furniture maker creates prototype office that squeezes more technology into less space

BY MICHAEL ALEXANDER
CW STAFF

In the rush to put personal computers in the hands of white-collar workers, it is sometimes easy to forget that there may not be any more space in the office to install new technology.

"A computer today takes up two feet by two feet on the desktop, but the available desktop area is only two feet by three feet," said Gary Ottenjan, manager of Haworth, Inc.'s venture group. "No one has given any thought to what workers are going to do for space."

Haworth, an office furniture manufacturer based in Holland, Mich., has put together a prototype office to give us ideas of how technology will fit and work in the office of the future.

"We took a look at the technology we thought would be in the office of the future and related that to the individual back in the office," Ottenjan said. While most corporations are quickly buying advanced technology, they are giving little thought to the environment in which it will be used, be said.

At the same time that more technology is being brought into the workplace, the size of the workplace is shrinking. The trend is toward smaller offices and shallower work tops, Ottenjan said. The result is that in the office of the future, technology will have to be more closely tailored to the work environment and even built into some pieces of furniture, be predicted.

Prototype office of the future *features oil painting-size hanging computer screens*

In Haworth's "Imagine the Future Work Station" prototype, computer screens hang on walls like large oil paintings, scanners are embedded in desktops, wireless keyboards and cellular telephones are installed in chairs, and windows double as computer conference screens. All of the work in what will ultimately be a paperless office is controlled by voice commands.

"It will be a total work environment," Ottenjan said.

Understanding the tools that future workers will use is important to designing working environments and furniture that allow technology users to work free of ailments that may result from pounding a computer keyboard or from peering through the glare on a computer screen for several hours per day.

"Five to 10 years from now, there are going to be people who will work eight hours or more a day at a keyboard," Ottenjan said. "They will need to be able to adjust the tabletop, arrange the seating, remove the glare from the screen."

The Imagine the Future Work Station prototype has two office settings: One side of a privacy screen is designated for an executive and the other for support staff. A comparable setup using existing, off-the-shelf gear, which must be modified to some extent, would cost between $50,000 and $100,000, according to Ottenjan.

Virtual display comes off the drawing board and into use

BY MICHAEL ALEXANDER
CW STAFF

About two years ago, Reflection Technology, Inc., a small company based in Waltham, Mass., caused a stir by introducing a miniature "virtual display," which, when positioned close to the eye, made it seem like a 12-in. screen was floating in space a couple of feet in front of the user.

The possibilities for the Private Eye display were endless, the company claimed at the time. Reflection's marketing executives conjured up visions of ultracompact portable computers for traveling sales representatives, pocket-sized, electronic instruction manuals for aircraft maintenance workers and even integrated patient monitoring equipment for anesthesiologists. The tiny display, which is worn on a headset, would be a boon to virtually anyone who needs to work hands-free and move about unencumbered yet still read displays, they said.

Well, those predictions and a few others have come true. There are at least eight companies ready to introduce products based on the display, including the following:

- Hughes Aircraft Co. plans to market a portable computer-aided diagnostic manual. Maintenance personnel can read screens of technical information without shifting their vision or removing their hands from the job, thus helping to ward off potential errors or accidents, the company said.
- One of Ampro Computers, Inc.'s customers plans to use an expansion board made by Ampro and the portable display in factory-floor automation equipment, said Paul Rosenfeld, vice-president of marketing. Ampro makes miniature IBM Personal Computer- and AT-compatible expansion boards for point-of-sale terminals, automated teller machines and other systems.

The customer intends to replace the ruggedized displays used in its machines with a port to connect the Private Eye display's cable. "A guy will be able to walk up to the machine, plug in the Private Eye, check out the machine and then unplug the display and go on to the next machine." The customer figures to cut the cost of each of its machines equipped with a display by $500, Rosenfeld said.

- Also basing products on the display is Cyberspace Corp., which is marketing an Intel Corp. 80286-based laptop computer with a full-size keyboard and built-in 40M-byte hard disk that weighs only six pounds.
- Portafax Corp. makes a pocket-size, paperless facsimile machine that enables users to retrieve and scroll through up to 25 pages of information.

Reflection's Private Eye display is positioned only inches from the wearer's eye. Although the window in the eyepiece is only 1-in. wide, with a bit of concentration, users can see what appears to be a 12-in. screen suspended in their field of vision. The device, which weighs only 2.5 ounces, displays 25 lines with 80 characters of text and graphics at a resolution of 720 by 280 pixels, the company said.

The LEDs on the single column turn on and off rapidly at the same time that the mirror, set at a 45-degree angle to the column of LEDs, vibrates through a 15-degree arc. The moving mirror, which is synchronized with the blinking LEDs, spreads the array of single columns, creating a full-screen, monochrome (red on black) image.

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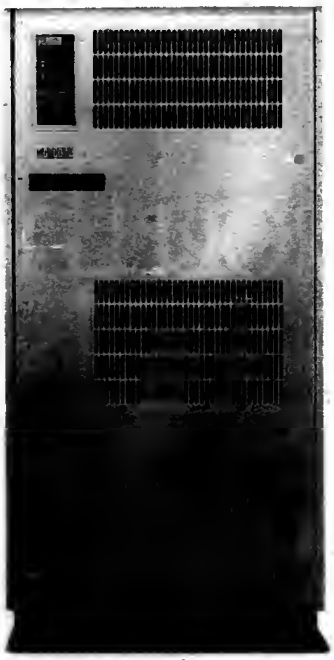

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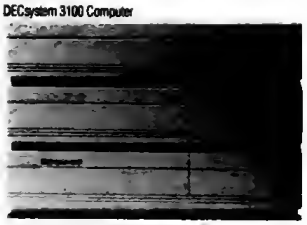
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EDITORIAL

Smooth it over

YOU COME INTO work and the database administrator informs you that a highly sensitive set of customer files has been compromised.

While the extent of the damage is unclear, she informs you that running damage-control diagnostics will run into the tens of thousands of dollars. She also informs you that the illegal penetration originated from across the country, and the purloined files may well have been transmitted to Taiwan. What to do? Call the police? The FBI, certainly. And get the word out that your site has been hit to alert at least those customers whose files have slipped your security.

Right. If yours is like more than 90% of the sites that get hit, you'll do the Watergate shuffle and cover this mess up as completely and as quickly as possible.

Why the heck not? As the conclusion of our four-part series on computer crime shows, there just aren't a lot of good reasons to do otherwise.

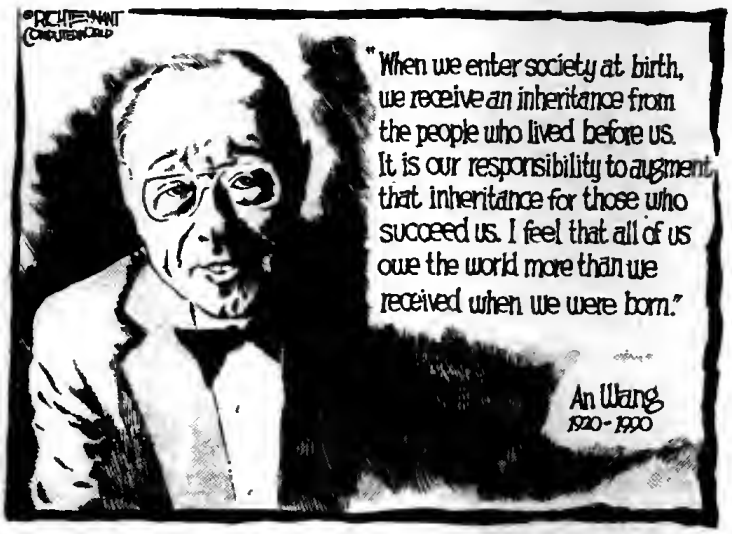
The computer crime laws are vague at best. If the crime involves transborder flow of data, you have a better chance of hitting the four numbers downtown than successfully pursuing the thieves through the courts. Further, with law enforcement officials up to their eyeteeth investigating murder, mayhem, drugs and big-time swindling, they haven't shown much enthusiasm for arming themselves with loosely conceived laws and pursuing computer criminals.

Finally, given the adverse publicity that results from a compromised system, the most expedient course of action may just be to keep mum and swallow the damages.

It is a truly sad state of affairs that, by some estimates, is costing U.S. businesses $4 billion annually. With the burgeoning growth in distributed systems and networks in general, the potential liability will grow geometrically. But frustration has quieted the alarm gongs and, as with earthquakes, people are just waiting for the next big one to hit, sensing that such an event is increasingly out of their control.

Editor's note

This week, we introduce a refocused and redesigned Computer Industry section, beginning on page 93. Computer Industry is one of the most durable and popular sections in *Computerworld*. The redesigned section reflects the increasing importance of industry news to IS professionals as such issues as vendor relationships and industry standards take center stage. With more of our news coverage focusing on industry news, the Computer Industry section will take a keener, analytical approach. Each week, we'll profile a vendor, market segment or trend that is making an impact on the industry. We've also increased our coverage of international issues and instituted regular columns on law and major contracts. Our goal is more information and easier access to it in the same-size package.



LETTERS TO THE EDITOR

Real leader

The recent article on Computer Associates' Unipack VM Package [CW, Feb. 12] featured a quote from Computer Intelligence that stated, "CA-Unipack's components dominate the mainframe market." This is simply not true for the VM mainframe market.

The article's numbers imply that CA-Unipack/VM components dominate the VM market. In actuality, Systems Center's VM software products are leaders in the VM market by more than a 2-to-1 margin.

Systems Center has worked hard to provide valued products and support for the VM market, and our market share demonstrates this.

Darrell Trimble
Manager, Product Marketing
Systems Center, Inc.
Reston, Va.

Apple II it

Regarding "Apple's turnover sours image" [CW, Feb. 12], you stated that Apple Computer, Inc. will have to "reshuffle its deal" if it wishes to actively compete with Intel 80286 IBM Personal Computer clones. What you, most consumers and Apple fail to realize is that the Apple II line can easily handle low-end and midrange computing tasks.

The 16-bit Apple IIGS can run at 7 MHz. Most GS packages come with 1.25M bytes of random-access memory (RAM), two 800K-byte 3½-in. drives, a 4,096-color monitor, a mouse and all of the start-up disks necessary to get one going. It is also easily networkable through the built-in Appletalk connector, modem port or small computer systems interface port.

A comparably priced 80286 AT package (running at only 12 or 16 MHz) would include 1M byte of RAM, one 720K- or 1.2M-byte floppy disk drive, a 20M-byte hard drive and a monochrome monitor. Like most IBM-compatible add-ons, there is no one "standard" mouse configuration; the DOS world is not known for ease of use. Start-up disks are mainly a novelty in the IBM PC world, where users must often take classes on how to use a program.

The entire Apple II line has a lot going for it; it is a wonder why Apple has not aggressively marketed it for small or moderate business use.

Stephen A. Craft
New Brunswick, N.J.

Ambidexterity

We were interested to read your recent article "Managers find RISC not worth the gamble" [CW, March 5], which focused only on the frustrations customers have with some Unix-based reduced instruction set computing (RISC) systems.

Unfortunately, the writer neglected to mention that there are "ambidextrous" RISC vendors such as Hewlett-Packard, whose RISC architecture has been designed to perform equally well in commercial and technical applications. RISC systems using this ambidextrous architecture avoid the performance problems customers experienced with Unix-only architectures.

In addition, there are now more than 3,000 software applications available for Precision Architecture-RISC systems and plenty of customers — such as 3M Co., PRC Realty Systems, DHL Europe and L.A. Gear, Inc. — that are successfully using HP RISC systems for their commercial application needs.

We hope future articles will include quotes from these companies or from the many other customers who have found RISC clearly is worth the investment.

Wim Roelandts
Vice-President and
General Manager
Computer Systems Group
Hewlett-Packard Co.
Cupertino, Calif.

Human worth

I really enjoyed your article "Bridging the real and unreal" [CW, March 12]. I did not realize that the research in this area had progressed to the degree that it has. I particularly saw the direct benefit to the medical community as was suggested, since in some situations they truly do "bury" their mistakes.

I was, however, a little taken aback by the quote from Dr. George Beeler, "It isn't worth the bucks." A human life isn't worth $500,000? I can't help but wonder: How much *is* a human life worth in Dr. Beeler's opinion? Perhaps we can begin to understand why malpractice insurance and doctors' fees are so excessive. With attitudes like this in the medical community, I would not want to be the company issuing malpractice policies.

A. Kent Smith
West Hill, Ont.

Computerworld welcomes comments from its readers. Letters may be edited for brevity and clarity and should be addressed to Bill Laberis, Editor, Computerworld, *P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701. Fax: (508) 875-8931; MCI Mail: COMPUTERWORLD.*

Industry instability: A sure thing

CHARLES LECHT

The unsettled nature of the new hardware and software that is making it to the marketplace these days may offer a prelude of things to come in our computer industry for the remainder of the decade. It should also warn information systems managers that they may do well to batten down the hatches and prepare for another techno-storm of potentially greater force than they experienced in the 1980s. For now, making lasting hardware and software plans for IS facilities may be all but impossible.

Most unsettling at the start of the 1990s is the need to deal with technologies that are transient. We got fooled at the start of the '80s when we dove in headfirst to buy what was just the beginning of an endlessly changing personal computer/terminal computer system or some almost-dead-ended systems such as those Osbornes, TIs and Fairchilds no longer with us. However, we're wiser now.

For example, there are those fancy boards that convert one manufacturer's computer system into another's, such as a Motorola-based processor capable of running Intel-based applications. Others convert computer systems into multimedia contraptions featuring jukebox/video/audio and multiresolution graphics facilities. We'd do well to be prudent and await the day when these systems settle down to become standard equipment. Until then, the likelihood of endless board changing to keep up with the latest thingamajig is a strong possibility.

Then there are those new compact disc/read-only memory and optical disc devices that eliminate the need for last year's big-volume, small-size hard disks. You know, the ones you just got used to using.

You have every right to say, "Hey, wait a minute; where's it all going?" Read/write erasable optical discs and ever-cheaper read-only memory discs virtually eliminate the need for today's floppies. Why? Because on one 5-in. optical disc you can write the equivalent of 20,000 *Computerworld* newspaper pages. After using an optical disc, dealing with floppies makes you feel like you are back in the punched card days.

Equally unsettling at the start of the 1990s for PC/terminal users is the OS/2 vs. Unix software argument. As though the group making the most noise were on the road to victory, it is especially unsettling to learn that many who voice their solid commitment to Unix are resolutely, albeit sometimes quietly, implementing OS/2.

The bottom line for users is that it is dangerous to make software plans based on any presumed standard, although it is my bet that OS/2 will prevail for PC/terminal desktop business systems and workstations. Even worse is the possibility that both camps may win, leaving users with an incomprehensible and incompatible software mess to sort out. Just thinking about the training required to make, run and maintain software in an IS facility running PC/terminals on DOS, OS/2 and, inevitably, several versions of the thing called Unix, is depressing.

To top it all off, we must now contend with the new wave of architectural oddities that have little or nothing in common with their predecessors and against which millions of instructions per second measurements defy comparison. For example, while there are legitimate uses for reduced instruction set computing, let's face it: It is a different breed of animal then the full instruction set computing to which we have become accustomed. Why anyone would benefit from the introduction of RISC into his IS facility to do everyday business data processing escapes me.

Tom Payne

We cannot dispute the fact that netted to the bottom line, the technological change of the past decade brought evermore powerful computer systems to the marketplace at ever decreasing costs.

However, we have to distinguish between the cost of this alone and the bottom-line cost of the disruptive changes it brought into IS facilities. We'd be hard-pressed to argue that the old technology left in a stable environment could have provided a better return than installing the improved technology, disruptive as it was. However, handling the change was unsettling to say the least, and it took its toll on IS managers unable to cope.

The most successful IS managers of the '80s were those who managed to control continuity and change with a firm but light hand. I offer the image of a cowboy wishing to stay in the saddle on a bucking bronco. For the '90s, we may want to conjure up the image of the same cowboy on an enraged bull. "Not to worry," we are told. "What's happening today is the wave of the future." But we cannot help worrying: the last wave of the future landed on our shores only yesterday.

Lecht is an IDG News Service correspondent based in Tokyo.

The Doctor leaves behind a legend and a legacy

GLENN RIFKIN

This is not the way it should have ended for Dr. An Wang. The headlines during the past 18 months have trumpeted losses, layoffs and lost eminence for Wang Labs. The sad demise of this once leading-edge company included the failure of the heir apparent, Fred Wang, to lead his father's company back to prominence.

The Doctor, as he was affectionately known throughout the company and industry, deserved a better finale than this. Wang Labs should have been hot, as it was during the 1970s and early '80s — an exclamation point to a remarkable career.

Fortunately, the reports of the Doctor's death have not dwelled on the recent uncertainties of his company. Rather, there has been an overwhelming sense that this brilliant man transcended the corporate fortunes of his beloved enterprise. Nothing could be more true. The name Wang will be remembered for genius, generosity, vision and dignity — characteristics that are born of a lifetime rather than a single business cycle.

The Doctor reflected a different attitude toward wealth and fame than has become standard today. He eschewed the spotlight for a position of quiet strength in the background. He was an entrepreneur who didn't grow his enterprise quickly and sell out for financial gain. He stuck with his vision for nearly 40 years.

Yet An Wang was not without flamboyance. He was not shy about naming the company after himself and making it clear that this family business would be passed on to his son rather than to outsiders. However, this was the mark of an immigrant's pride in what this country allowed him to accomplish rather than a symbol of vanity and greed.

Having left war-ravaged China in 1945, Wang arrived in the U.S. prepared for a short stay and a chance to continue his studies. What he found instead was a place and time ready to exploit his intellectual skills — the confluence of chance and talent.

He never forgot the institutions in this country that granted him the space to turn his genius into opportunity — places such as Harvard, where he studied with the likes of Howard Aiken in the Computation Lab and E. Leon Chaffee, his mentor in physics. He was a key figure in the creation of the pioneering Mark IV, and it was at work on this project that he developed the concept of magnetic core memory as a replacement for unstable vacuum tubes. In his 1986 autobiography *Lessons*, he graciously credited Jay W. Forrester at MIT with advancing the concept to a level that made it practical for industry.

In the same book, Wang wrote about responsibility. He made it clear that he owed something to the people and institutions that gave him his chance. He transferred that personal feeling to his company.

"The very nature of business makes it all the more important that a sense of social responsibility be deeply rooted in a corporation," he wrote.

To that end, the Doctor committed himself to the communities around Boston, particularly Lowell, where Wang is headquartered. He took a chance on relocating Wang to Lowell in the mid-1970s when that former mill town was down and troubled.

Dr. An Wang

In less than 10 years, Wang Labs led a rebirth of the whole Merrimack Valley region and was a major player in the vaunted Massachusetts Miracle. For the thousands of Wang employees who built families and homes along with careers at the company, there was tremendous pride in seeing the blue letters of the Wang name as one drove past the corporate tower.

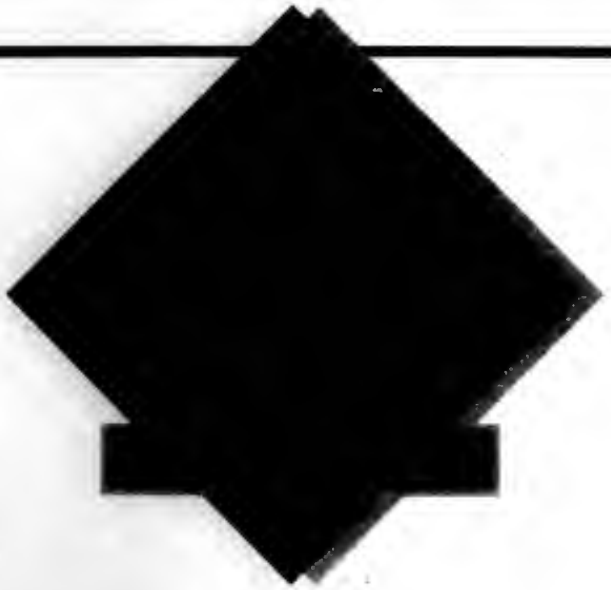
In the early 1980s, the company's success as a word processing and office automation vendor drove the stock to a level that made An Wang one of the richest men in America. Yet employees found the bespectacled, bow-tied presence unchanged.

Wang's struggles have been well-documented. The seeds of trouble probably began during Wang's heyday in 1983, when the Doctor pulled back from the day-to-day handling of the company and things began to get out of control.

Missing critical market opportunities, turning over the coming crisis to his inexperienced son and losing control of internal cost structures added up to a corporate nightmare for the Doctor. At the time of his death, Wang Labs was in the hands of a new, tough corporate leader whose last name is not Wang. Thousands have been laid off, and the future is uncertain.

All that proves is that fairy-tale endings can't be guaranteed in the harsh realities of business. It proves nothing, however, about legacies. In this case, the contributions far outweigh the losses; the sum of the lifetime is rich beyond balance sheets and earnings reports.

Rifkin is a *Computerworld* features editor.



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SOFT TALK

J. A. Savage

New Wave no splash

It doesn't fit easily into any category; maybe that's why it doesn't seem to be catching on with managers.

It's one year old, and that still may be too new for users.

Vendors, however, are betting on it.

New Wave is not just an object-oriented graphical interface. Hewlett-Packard's software also has program-building capability and allows different programs to work together.

While it may sound useful, it also sounds far-fetched, according to my unscientific survey of HP users at the Interex user group meeting last month in Las Vegas.

However, while the users at Interex were surrounded by clanging slot machines and Anthony and Cleopatra stand-ins at Caesar's Palace, two more vendors said they would license New Wave for their own selfish purposes.

"It was our pure self-interest at heart," said an AT&T official, who added that the company needed a common desktop icon for DOS-based Microsoft Windows (where New Wave resides) but that it could be made to ride on the Unix operating system.

This came about despite AT&T's stake in a similar-looking interface — Open Look — developed with Sun specifically for Unix.

Continued on page 33

CA on-line help leaves users hungry

BY ROBERT MORAN
CW STAFF

GARDEN CITY, N.Y. — Despite enthusiasm for Computer Associates International, Inc.'s recently announced no-cost on-line service for accessing program temporary fixes (PTF) and product information bulletins, potential users said they want additional features.

The new service, called CA-PTFAID, allows companies with CA software maintenance agreements to dial into CA's Customer Service System via a dial-up terminal or personal computer and review PTF and product information bulletins. However, users lamented that the service lacked the ability to download needed PTFs.

"The tools could be better," said David Kasabaum, technical support supervisor at the Missouri State Office of Administration in Jefferson City. "They could allow us to do downloads of fixes, but at least it gives us a chance to go out and search the database and see if we can find a similar problem."

A CA spokesman said that the company has no plans to offer the downloading of PTFs in CA-PTFAID because CA-Uniservice/II, a service and support system, offers users the ability to download PTFs as well as submit questions, analysis requests and documentation to CA's technical support database. While CA-PTFAID is free, CA-Uniservice/II carries a $20,000 one-time charge and an annual access charge of 6% of the license fee for any CA software with which CA-Uniservice/II is used.

Bug-buster

Nevertheless, users said CA-PTFAID will allow them to be more active in their battle against bug-ridden code.

"We will establish a routine for looking at CA's database because with the level of complexity that vendors write with these days, it is nearly impossible to have perfect code," said Brenda Roisen, database administrator supervisor at the Handleman Co. in Flint, Mich. Currently, Roisen takes critical PTFs over the phone or from a facsimile. "To get PTFs on-line myself would be a lot easier and a lot less time-consuming," she said.

Brian Callahan, director of technical support at Central Maine Power Co. in Augusta, said that he welcomed the announcement because CA PTFs are numerous, depending on the CA product. "It is another extension of saying 'Our quality stinks. Here, customer — you fix it,' " Callahan said. He added that he was contemplating purchasing CA-Uniservice/II because it offers the ability to download PTFs, which will save his staff time.

Kasabaum said that CA PTFs will bring a marked improvement to his service cycle and eliminate the need to wait for return telephone calls.

He compared CA-PFTAID with IBM's no-charge Softwarexcel Basic but said that the IBM offering is "a little bit more enhanced because you can see problem reports."

System is just the ticket for New York museum

ON SITE

BY MAURA J. HARRINGTON
CW STAFF

When a person visits the touristic South Street Seaport Museum in Manhattan, the ticket received upon payment is probably the last thing the visitor is thinking of while wandering around the outside museum, exploring the ins-and-outs of the *Pioneer*, the museum's schooner, or taking a boat ride around the harbor on one of the Seaport Lines.

That ticket could eventually serve as a memento of the museum when the day is long past, but the memories themselves mean more than the ticket to most.

To Jerome Van Wert, the South Street Seaport Museum's computer operations manager, each ticket is a symbol of his work and a product of the 1½-year-old computerized ticketing system, which is the heart of the museum's customer tracking system.

Although the tickets are seemingly simple and all look virtually the same, they are linked to a somewhat complicated ticketing system, organized and updated by Van Wert.

"With our new ticketing system, we have the capability to keep track of all different types of people walking through the door," Van Wert said. By running a Digital Equipment Corp.-based nonprofit package from Explorer Technology, Inc., based in Emeryville, Calif., the museum is able to differentiate its customers by age, group type or organization.

With more than 10 different ticket categories in which to classify the customer, ticket agents take about 20 seconds to make each ticket, inputting the customer type, cost of ticket, type of ticket and any other type of necessary information, before sending the information to a Boca Microghost ticket printer, made by Margate, Fla.-based Boca Systems, Inc., Van Wert said.

Keeping track of the clientele, Van Wert added, is important because it helps virtually every department in some way.

For example, M. J. Shaughnessy, the school groups organiser at the museum, uses the computer ticketing system to keep track of the different school groups scheduled to visit the museum.

With 15 different programs, the system has saved Shaughnessy several hours in scheduling and coding, she said.

Although the new system still needs to be tweaked and sometimes crashes, it has saved the

Continued on page 32

Technology and history work together at the Seaport Museum

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Processing Topologies Supported						
Peer-to-Peer Processing	✓			✓		✓
Existing terminal-based systems	✓	✓	✓		✓	
Mixed Peer-to-Peer and existing systems	✓					
Application integrity/Software Distribution	✓		▬			
SAA/CUA Interface compatibility	✓	✓	▬			
Workstation Environments Supported						
PC/DOS	✓	✓	✓	✓	✓	✓
OS/2	✓	✓	✓	✓	✓	✓
PC/DOS to OS/2 application compatibility	✓		?			
LAN Server for shared applications and data	✓		?			
Multiple transaction servers on a LAN	✓					
Development Environment Comparison						
Object orientation	✓	▬				
Dictionary and documentation	✓	✓				
Panel/Form painter for creation/maintenance	✓	✓	▬			
3270 screen capture: picture and attributes	✓	✓				
CASE/Application Generation	✓	✓				
Intelligent (language-sensitive) editor	✓					
System and user-defined reusable code templates	✓					
Integrated compile/test/debug	✓	✓				
Execution time source debugging	✓	▬				
All development tools for DOS available in DOS	✓		✓			
Objects Supported						
CUA display images	✓	✓				
CUA dialog within display object	✓					
Validation within display object	✓					
Help processing	✓					
Error processing	✓					
Text window interactions	✓	▬				
Business graphics	✓	✓				
3270 definition	✓					
Interactions with 3270	✓					
Interactions with Peer-to-Peer	✓					
"Logon" Scripts	✓					
Application integrity/Software Distribution	✓					
Local Data Access						
Indexed files	✓		✓			
dBase	✓		✓			
Flat Files (random access)	✓					
Flat Files (sequential access)	✓	✓	✓			
Multiple read/write to files on LAN Servers	✓					
High Level Functions Directly Available in the Language						
Field-level context sensitive help	✓		✓			
Optional user learning mode	✓					
Display and selection from:						
Indexed files	✓		✓			
Sequential files	✓	✓	✓			
In-memory lists	✓	✓	✓			
Menu display and selection	✓		✓			
Determining 3270 screen identification	✓		✓			
Read/write to 3270 in a single command	✓					
Read/write to 3270 one field at a time	✓	✓	✓			
Determine dynamic 3270 attribute changes	✓					
Embedded user assistance (pop-up selection lists)	✓					
Data editing/validation:						
Data type/mark checking	✓		✓			
Single range/limit check	✓		✓			
Field/data driven range/limit check	✓					
Date formatting/validation	✓		✓			
Validation against local and LAN files	✓					
Required fields	✓		✓			
"Must Fill" fields	✓					
Zero not valid fields	✓		✓			
Peer to Peer Host Environments Supported						
MVS-CICS	✓			✓		✓
MVS-IDMS/DC	✓					
MVS/TSO	✓					
DOS/VSE-CICS	✓			✓		
VM/CMS	✓			✓		✓
DEC VAX/VMS	✓					
Software Distribution Host Environments Supported						
MVS-CICS	✓		✓			
MVS-IDMS/DC	✓					
MVS/TSO	✓					
DOS/VSE-CICS	✓					
VM/CMS	✓					
DEC VAX/VMS	✓					

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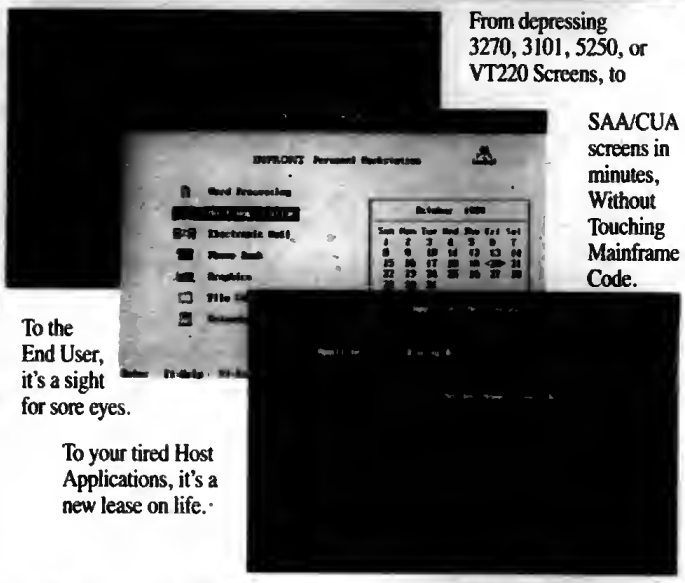

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Minneapolis' state-of-the-art 911

ON SITE

BY ELLIS BOOKER
CW STAFF

Emergency services operators in Minneapolis were handling 911 calls adequately a couple of years ago, but the information systems department was worried.

In one sense, Minneapolis was ahead of many other U.S. cities. Its computer-aided dispatch system replaced a traditional system that called on operators to scribble the details of incoming emergency calls onto paper tickets.

However, the computerized system, designed and installed by Arthur D. Little, Inc. in 1979, was a technical orphan. Nine months after the system went on-line, Little left the market.

By 1985, response time on the system, which had been written in assembler and was virtually impossible to reconfigure, was 30 seconds during peak hours, when each 911 operator can field 50 calls per hour.

In 1987, Minneapolis, Denver, Pittsburgh and 12 other cities formed a consortium to develop a next-generation product. "We decided to get together and tell the industry how to do it," according to Paul D. Linnee, the city's straight-talking director of emergency communications.

That request for proposals (RFP) was developed by Bill Brun, a senior systems analyst in the city's IS department, and Patti Huber in the department of emergency operations.

Among the requirements was that the replacement system have an open architecture and be programmable by the city.

Although the consortium did not last, Minneapolis developed a comprehensive RFP for the replacement system. In July 1988, AT&T won the contract for the $4 million system, which was deployed last October. Denver and Pittsburgh also plan to install it. Minneapolis will get a portion of AT&T's sales of the system.

At the heart of the system is AT&T's top-of-the-line minicomputer, the 3B2-1000 Model 80, and a 3B2/700. Minneapolis officials said they believe they have the first installed site in the U.S. for the Model 80.

The dual processors are connected over a Transmission Control Protocol/Internet Protocol (TCP/IP) dedicated data line and feature mirrored storage disks. All the processors run AT&T Unix System V; the application software is written in C.

During an emergency, speed and accuracy are essential. The new dispatch system works to speed up the operators in several ways and can help them complete a dispatch in as little as seven seconds:

- Automatic number identification data, delivered from the phone network, is cross-referenced to a database that pulls up not only the name and address of the caller but any special instructions about his or her location that could aid rescue workers.
- With the phone number and address added automatically, 911 operators need only key in a "nature code" to complete a valid record. A single nature code can be set up to mean different things to a police squad car, a fire engine or an ambulance.
- Once assigned a code, calls are automatically ranked for the operator, and the system generates priority codes to the separate police and fire systems.
- The system maintains on-line a 2½-month record of all calls, allowing the Lotus/Intel/Microsoft Expanded Memory Specification department to search for relationships between crimes.

The system's database management system is from Oracle Corp.

Ken DeFoe

Paul Linnee *helped resuscitate Minneapolis' emergency services*

Although Linnee quipped, "We're not part of the administrative side of the house . . . we're part of the real world," his system is part of a greater whole.

The EMS system has been linked to existing police and fire systems, which reside on separate Unisys Corp. A series hosts.

Because an event recorded by the dispatch system typically includes most of the information required by the other information systems — names, times, address and actions — it saves administrative time, according to city MIS director Gary N. Sherburne, who added that "thinking about the [dispatch system] united us with the other agencies."

However, perhaps the most distinguishing characteristic of the dispatch system, and the element that could have the greatest impact on delivering services in emergencies, is its use of mobile data terminals.

Ultimately, these dumb terminals — about 220 are planned — will give police officers access to the dispatch system as well as to state, city and police computer systems from emergency vehicles, which themselves will be coupled as part of the citywide office automation project.

The $900,000 office automation project, which AT&T won separately in 1988, currently connects existing AT&T Starlan and personal computer networks to AT&T and Unisys hosts through AT&T's Information Systems Network node. The network, which will feature a fiber-optic backbone, will eventually connect to IBM mainframes operated by the city and the state.

Bachman launches conversion utilities

BY ROBERT MORAN
CW STAFF

Bachman Information Systems recently unveiled a new release of its Bachman/Re-Engineering Product Set, as well as two conversion utilities aimed at optimizing data models for DB2 production databases.

The company announced Bachman/DA Link (IEW), an interface to the Information Engineering Workbench from Knowledgeware, Inc., and Bachman/DA Link (Excelerator), an interface to Index Technology Corp.'s systems analysis workbench, Excelerator.

According to Bachman, the two conversion utilities, which run under PC-DOS, permit the Bachman/Data Analyst to capture, import and optimize data models from IEW and Excelerator as part of the forward engineering process.

Marine Midland Bank in Buffalo, N.Y., served as the beta-test site for the Bachman DA/Link (Excelerator). Lisa Noon, the bank's database administrator, said the new link will enable Marine Midland to jump from Excelerator, where the company performs its process definitions, to the Bachman tools, which the company uses for data modeling.

Bachman does not offer the ability to do process definitions. In the past, Marine Midland used Excelerator to create Cobol record descriptions and import them into Bachman. "Unfortunately, you lose just about everything you had in your Excelerator dictionary in the conversion," Noon said. "The interface now preserves that information during the conversion."

Nevertheless, Ken Fuerst, a systems engineer at the bank, said that Marine Midland is a maintenance-intensive environment and that he would like to see an interface that permits reverse engineering. According to Fuerst, Index officials told him that the project was on hold. "Now, once we have the data model in Bachman and it is changed there, it is very hard to keep our primary dictionary [Excelerator] and Bachman in sync."

SAA link

Bachman also announced Release 2.2 of the Bachman/Re-Engineering Product Set of Systems Application Architecture (SAA) design tools for IBM Application Development/Cycle strategy.

The link products, as well as Release 2.2, are aimed at optimizing database designs for DB2 production. According to the company, the link products, which use Bachman's embedded Expert Advisor, enable companies to merge Excelerator and IEW designs into a consistent entity-relationship module.

According to the company, Release 2.2 of the Bachman/Re-Engineering Product Set will support IBM DB2 Version 2, Release 2 SAA DBMS.

Within the product set, the Bachman/Database Administrator (DB2) and the Bachman/DBA (DB2) Catalog Extract have been enhanced to support the creation of distributed databases by, for example, allowing users to capture, create and modify alias definitions from the data description language for merging into database designs, the company said.

In addition, the company said that Release 2.2 improves free space calculations, which gives users additional control in measuring space requirements for active-growth and less active portions of the data.

The Bachman/DA Link (IEW) and the Bachman/DA Link (Excelerator), became available last month and cost $1,500.

Release 2.2 of the Bachman/Re-Engineering Product Set became available at the end of March. New customers will pay between $15,000 and $60,000, depending on the workstation's configuration and quantity discounts. Existing customers will receive upgrades through their maintenance contracts, the company said.

DEC takes integration walk on the small side

BY MARYFRAN JOHNSON
CW STAFF

Calling it the "smallest VAX subsystem ever available," Digital Equipment Corp. recently unveiled a new real-time application processor along with enhanced software that permits integration of real-time applications with networked VAXs.

Scheduled to be available in June, the $2,000 application processor is a daughterboard configuration that includes a VAX processor, floating-point coprocessor and Ethernet coprocessor module measuring 3 to 5 in. long.

The subsystem is small enough to become part of an instrument or sensor circuit board, and it packs enough power (approximately 2.7 million instructions per second) to integrate seamlessly with network applications, according to DEC.

The design of the subsystem enables users to link private or industry-standard buses to Decnet networks as well as download application software over the network from another VAX computer.

The subsystem is targeted at manufacturers of robotics, instrument monitoring and control products.

Aiding the networking capabilities are several enhancements included in Version 4.1 of VAXELN software, which is designed to run under the VMS operating system on the new subsystem as well as other rtVAX systems.

> THE DESIGN OF the subsystem enables users to link private or industry-standard buses to Decnet networks.

The new software program, which has separate licenses priced from $1,082, comes with the rtVAX 300 and includes memory-resident fonts for Decwindows and a "pseudomouse" facility to simulate mouse functions from a keyboard.

VAXELN also includes DECnet networking software, TCP/IP links for communications with non-DEC Ethernet applications and DECwindows windowing capabilities.

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And because Avatar has designed MacMainFrame Gateway products using

HOW AVATAR SEES IT.

Apple Data Stream Protocols (ADSP), Mac users on any AppleTalk network can access mainframe services regardless of the connection.

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Avatar

Registry imaging system does the deed

Wang WIIS speeds title searches and piques interest of far-flung observers

ON SITE

BY MARYFRAN JOHNSON
CW STAFF

CAMBRIDGE, Mass. — Most of the tourists trooping through the Middlesex County Registry of Deeds these days are *not* stopping by to admire the century-old red brick building with its 25,000 books of deeds, mortgages and property titles.

The county officials calling from California, Washington state, New York state and Australia show scant interest in the historical value of land records dating back to colonial times.

What all these out-of-towners want to hear about is the new imaging technology that makes this registry the first in the nation to offer the public computerized access to electronic images of land records.

"We're trying to change the image of this registry," said Eugene Brune, who became register of deeds for Middlesex County's southern district last year. "We had a reputation of things progressing very slowly. Often there would be a wait of many months to get a deed back, and sometimes the work was slipshod."

The technology helping to alter that image is the Wang Integrated Imaging System (WIIS), which provides tools to capture, store, retrieve and display documents on imaging terminals connected to a Wang Laboratories, Inc. VS 8000 minicomputer.

The time-consuming search for evidence of a land transaction — covering data on 10 cities and 34 towns in Middlesex County — has been reduced to several keystrokes at one of the four on-line imaging terminals.

A title search that once took up to three weeks to accomplish can now be done in a matter of minutes, said Michael J. Ring, first assistant to the register.

The only catch is that images of recorded land documents are limited to transactions filed since January. Images of *registered* land documents — a separate category of transactions guaranteed by the state land court — reach back an additional six months, to July 1989.

"Because of the size and cost of these imaging jukeboxes, we can't afford to go back further right now," Ring said. The county spent $1.2 million to purchase and install the imaging system.

Although the imaging system is limited to recently filed documents, the search for a land record still has a shorter paper trail because of computerization, Ring added.

From a dozen public-access terminals hooked into the VS 8000's on-line database, visitors can tap into any Middlesex County land transaction since 1986. By the end of the year, that database will reach back another three decades to 1956.

Paper records such as mortgages, deeds and property liens are now scanned into the minicomputer to become part of the imaged database within 24 hours. The records are permanently stored on optical discs in the jukeboxes within 48 hours.

The registry will not attempt to image in the billions of documents gathered since 1639, however.

A staff of 90 handles roughly 250,000 transactions each year, generating a pile of paperwork that must be accessible to homeowners, real estate brokers, bankers, lawyers, title examiners, historians and property assessors. An estimated 300 searchers and recorders use the registry facilities daily.

The 6-ft-tall optical jukeboxes can hold 3.5 million images — about three years' worth of registry dealings. Once stored on disc, the images cannot be altered.

Middlesex County's Brune: *WIIS updates the registry's image*

The software managing the land records system is from Applied Data Systems, Inc. in Framingham, Mass. The Applied Data Systems application is written in Pace, Wang's application development language, so the addition of the imaging system required only a simple enhancement to the existing software rather than the longer process of customization.

The registry is extending its reach with another Applied Data Systems product called Landtrak, which gives assessors in neighboring towns dial-up access to the database of land records with a personal computer.

Applied Data Systems plans to market Landtrak jointly with Wang as off-the-shelf software to other registries.

The Massachusetts cities of Somerville, Watertown and Newton each purchased Vscom, a $95 telecommunications package from MH Group in Chicago, which emulates the VS terminal and connects their PCs with the minicomputer-based Landtrak. The fee is $100 per year and 50 cents per minute on-line.

Within the next month, a number of local attorneys will sign onto the system as well.

So far, the savings in convenience for the public and in productivity for county employees have been difficult to quantify, according to Brune. But in a place where one square foot of space is valued at $25, the notion of eventually clearing away tons of bulky record books and storing them safely off-site is attractive indeed.

"I can picture this registry building, maybe 20 years in the future, with hardly any books in sight," Brune said, smiling broadly. "There will be just one big room, filled with imaging jukeboxes."

Vendors ring in the '90s by ratcheting up prices

BY SALLY CUSACK
CW STAFF

Mainframe, midrange and microcomputer vendors will herald the new decade with sustained price increases across the board.

"Prices are moving upward at the mainframe level due to the multiprocessing power now available in the boxes," said David Moschella, a senior vice-president at International Data Corp. (IDC), a Framingham, Mass.-based market research firm.

At an IDC industry conference in Boston last month, Moschella predicted that midrange prices, which have leveled off during the past five years, will also drift slightly upward. This is a result of the midrange shift to specialized applications, as well as the migration toward reduced instruction set computing platforms, he said.

Personal computer prices will also climb, he continued, driven primarily by the advent of Intel Corp.'s 80486 technology and more sophisticated Apple Computer, Inc. platforms. "We'll see an ongoing shift to the smaller platforms, and it will be interesting to see who emerges as the low-end leaders," he said.

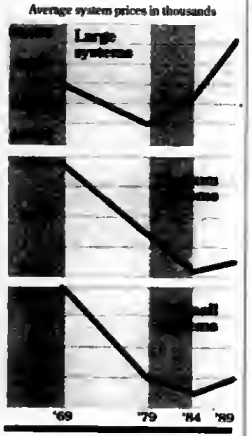
Out of the total capacity of processing power installed worldwide as of 1989, IDC research shows that only 10% was installed on multiuser systems, with the remaining 90% concentrated on PC platforms. Moschella speculated that use of multiuser system processing power will drop to 1% by the end of the decade.

> "THE U.S. IS still the most important market to follow with reference to industry trends."
>
> DAVID MOSCHELLA
> IDC

The high-technology picture for the U.S. in the 1990s is not as bleak as some would paint, he added. "The U.S. is still the most important market to follow with reference to industry trends, such as standards evolution, services and distribution," he said.

Up and downs

A look at 20 years of change shows the average prices for all systems have taken strange dips and climbs even without adjustment for inflation



Source: International Data Corp.
CW Chart: John York

Museum

FROM PAGE 25

accounting department "hours and hours" of time, according to Peter Reilly, the nonprofit organization's controller.

Before the system existed, Reilly said, it was much more difficult to differentiate museum ticket sales from boat ride ticket sales. Although boat ride sales belong to the Seaport Lines cruise company, a separate entity, the museum handles the boats' ticketing, according to Reilly.

"By putting the tickets into a computerized system, we were able to offer a lot of discounts and combination tickets without confusing the accounting department. It makes it easier for the marketing department, too," because it can sell a greater variety of combination tickets, Reilly said.

Reilly, who like the other administrators does most of his work on the museum's IBM System/36, said the DEC-based ticketing system works well so far but will not be combined with the IBM system anytime soon.

First, Reilly said, Van Wert must continue to concentrate on getting everyone in the museum familiar with the new system. Van Wert admitted the process was ongoing, as the employees tend not to be too "high tech."

"When I first came here, the system was very mixed up," Van Wert said. "Nobody liked the system, so I had to dazzle them with a few tricks. The mail-merging capability was one of the things that sparked an interest that wasn't there before I showed it to them," Van Wert said.

There are 11 DEC terminals running off the DEC Microvax II, located in four buildings. The Explorer software program, designed primarily for nonprofit organizations, has been customized for the Seaport Museum by Van Wert to include the weather forecast and other features specific to the museum.

Van Wert has also installed Wordperfect Corp.'s Wordperfect word processing system; Executive Software's Diskeeper, a disk-optimizing program; and Networking Dynamics Corp.'s VXTD software, which gives users split-screen capabilities.

Although efficiency is about 40% higher than before the computer system was installed, Van Wert said he is exploring ways to increase ticket sales even more, through the use of the computer system.

European aerospace contractors chafe at CALS

Major firms fear cost of compliance with U.S. plan, decide to publish own specifications

BY PIERRE BERGER
SPECIAL TO CW

LONDON — European aerospace contractors are troubled by the U.S. Department of Defense's Computer-Aided Acquisition and Logistics System (CALS).

CALS is the department's initiative to standardize all technical publications and data exchange related to weapon systems into a comprehensive Integrated System Weapon Database. Once implemented, along with appropriate networking, data from design production and support will be freely exchanged among defense users and contractors as it is generated.

Enthusiastic firms include U.S.-based Westinghouse Electric Corp. and TRW International. But not everyone is happy with the DOD's move. Major European firms such as British Aerospace, Inc. are pondering the cost of conforming to CALS' specifications.

Other observers fear that once again, the U.S. has moved away from international standardizing bodies. For example, CALS backs the Standard Generalized Markup Language for document processing and transmitting rather than the more widely recognized Open Document Architecture system.

For computer-aided design and manufacturing applications, CALS supports development of the Product Data Exchange Specification (PDES), originally part of the International Standards Organization's Standard for the Exchange of Product Data Models (Step) initiative.

Europe asserts its own standards

European industry is far from passive. The Association Europeanne des Constructeurs de Materiel Aerospatial has launched the Advanced Procurement and Logistics System and published its own specifications as an answer to CALS.

British industry, including British Aerospace, International Computer Ltd. and Rolls Royce Motors, Inc., is attracted by both the U.S. and Europe. Developments in Eastern Europe are increasing uncertainty. "The fog is rising again over the Channel, and we no longer see the Continent," said an attendee at the recent European Advanced Procurement and Logistics System '90 conference.

However, whatever the path, CALS and its potential European counterparts are here to stay.

"I believe that we cannot ignore CALS. CALS is a fact of life," said Martin Palmer, deputy director of Support Policy of the UK's Royal Air Force.

Savage

CONTINUED FROM PAGE 25

At the same time, NCR announced that it has plans for New Wave. In the last few months, Canon and Data General have also done so.

Outside of vendor licenses, HP won't say how many copies of New Wave are in use. But if interviews with the Interex users are any indication, I bet HP would have to answer that there are only a paltry few packages running in the corporate world.

Answers to the query, "What do you think of New Wave?" came in equal parts: "Huh?" "I've heard the name but have no idea what it is." "It's too far out; I'll wait." "It sounds good, but I have too much invested in my current software." And, "I don't care; I just lost $200 at the blackjack table."

However, HP is a patient company. It has other products to carry it through, and it seems to know that New Wave will not be left in its software case on the bookshelf next to the old Pac Man software while other applications pass it by.

Meanwhile, neither HP nor AT&T apparently think that Windows will be the only game in town for personal computers. Both are working on making New Wave run on Unix, as AT&T illustrated in its product announcements last week. Two weeks after Interex, HP announced its first step toward New Wave on Unix, with a New Wave-like graphical interface on Unix. With the product, which HP calls Visual User Environment, users should be able to add New Wave functionality as it is marketed. HP is also aiming New Wave at OS/2.

HP, however, stepped in its own vernacular recently when it decided to rename its strategy of hooking everything up to everything else, formerly known as "Cooperative Computing," to "New Wave Computing." If you get confused over what HP is talking about when you read *Computerworld* — the big picture or the application — call the image-makers at the top of the corporate ladder; don't call your lowly journalist.

Then there's the problem of what to call it when it's been around for a few years. Mature Computing? Geezer Technology? Senescent Systems? Think about this, HP, before you package your technology like detergent.

Savage is a *Computerworld* West Coast senior correspondent.

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Tampa	May 24	Tarrytown	May 10		
Georgia		White Plains	March 15		
Atlanta	May 6	**North Carolina**			
Hawaii		Charlotte	June 6		
Honolulu	May 30	Research Triangle Park	April 4		
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THE SYBASE SEMINARS

NEW PRODUCTS — SOFTWARE

Artificial intelligence

Idea, a diagnostic expert system from AI Squared, Inc., has been enhanced with two features.

Idea Release 3.0 includes a graphic development editor feature that allows diagnostic applications to be built by mimicking the design process. An explanation feature automatically generates recommendation or replacement advice from a model of a device under diagnosis, the vendor said.

Idea is available in versions for both development and delivery environments. The license fee for the former version is $15,000; the latter sells for $300 per machine with a yearly renewal license fee of $100. Both versions run on IBM Personal Computer AT compatibles.

ASI
139 Billerica Road
Chelmsford, Mass. 01824
508-250-4000

Development tools

TGR Software, Inc. has announced Tiger Connection 4.0, a personal computer-based PC-to-host development tool.

The English version of Tiger Connection 4.0, which was initially marketed in Portugal and Brazil in December 1989, has been adapted with complete documentation and support for the U.S. market. The product allows users to create PC-to-host applications without developing custom mainframe programs, the vendor said.

The price for Tiger Connection ranges between $7,200 and $75,000, depending on volume purchased. Unlimited-use corporate licensing is also available.

TGR
Suite 330
Two Ravina Drive
Atlanta, Ga. 30346
404-390-7450

Jyacc, Inc. has announced that its front-end tools — the JAM and JAM/Dbi — are now available for Digital Equipment Corp.'s VAX SQL/Services.

A JAM or JAM/Dbi application on a personal computer running MS-DOS can use Decnet and Decnet-DOS to transparently retrieve or store data residing on a VAX, the vendor said. JAM reportedly enables programmers to prototype and develop applications that can be ported across 100 hardware platforms and 10 operating systems.

The JAM and JAM/Dbi development kit costs $990.

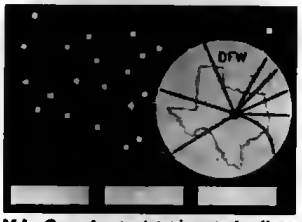
Jyacc
116 John St.
New York, N.Y. 10038
212-267-7722

V.I. Corp. has announced DV-Proto, a visual prototyping tool that enables application developers to evaluate and present an application without any coding.

The device allows users to visually program screen layouts using an interactive point-and-click method. A graphical interface is created in a drawing editor that includes rules attached to such objects as menus, toggles and sliders. The rules can trigger events such as switching between views, adding overlays and creating pop-up objects.

The initial release runs in a Unix environment on a Sun Microsystems, Inc. workstation. A development license for the product is being offered for $8,700.

V.I.C.
Amherst Research Park
Amherst, Mass. 01002
413-253-3482



V.I. Corp.'s ***prototyping tool allows point-and-click programming***

Prophet Systems Group has announced Release 1.0 of Pik 'n Help, an Information Builders, Inc. PC/Focus enhancement product that provides additional functionality for PC/Focus developers.

Pik 'n Help serves as a compact, user-written subroutine that uses 12K bytes of memory and provides windows and text management functions in all three PC/Focus environments — Modify, Dialogue Manager and PC/Focus Windows — the vendor said. A Decode function and a Help feature are also offered.

The product supports PC/Focus under DOS and is priced at $149.

PSG
8 Copples
Wallingford, Pa. 19086
800-224-3026

Utilities

Symark International, Inc. has announced CMA-Tsoplus Version 3, an enhancement to Tsoplus, its multifaceted productivity platform for IBM's TSO.

Version 3 provides installations that specify a list of frequently used library members, such as panels and messages, which can be held in virtual storage. Commands, programs, CLISTs and panels can be set up to run as on-demand applications that can be accessed by a special menu.

Tsoplus costs between $13,500 to $24,900, depending on CPU license.

Symark
Suite 502
5655 Lindero Canyon Road
Westlake Village, Calif. 91362
818-889-0978

Raxco Software, Inc. has introduced Perfectdisk, a disk I/O optimization system for Digital Equipment Corp.'s VAX/VMS.

The product can make files and free space contiguous as well as detect when a file is being used or when file access is being attempted while defragmentation is in progress, the vendor said. Perfectdisk optimizes file placement and allows system managers to determine where free space or files should reside on a disk.

The price ranges between $1,050 and $8,750, depending on VAX configuration.

Raxco
Suite 200
2440 Research Blvd.
Rockville, Md. 20850
301-258-2620

The On-Line RDBMS. What is it? And what are its benefits?

The Sybase View

Business critical on-line applications can dramatically affect the competitiveness of an organization. They require an on-line RDBMS architected to integrate real-time decision support and transaction processing across networked environments.

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For the best price performance and absolute performance, an on-line RDBMS must scale up, or down, as business needs dictate. Only an on-line RDBMS with a multi-threaded programmable server architecture has proven successful in handling peak loads, with subsecond response time, for large numbers of users, on a variety of platforms.

SERVER-ENFORCED INTEGRITY

An on-line RDBMS must enforce data security and integrity rules, including referential integrity, *in the database* rather than in each application. This requires an intelligent, programmable server architecture. This architecture dramatically reduces enterprise-wide application development and maintenance time while improving protection and data consistency.

HIGH APPLICATION AVAILABILITY

An on-line RDBMS provides high application availability to avoid costly downtime. It performs backups, recoveries, and database administration changes while applications continue to run. And it supports fault-tolerance with mirrored logs and databases, as well as multi-CPU recovery to minimize exposure to hardware problems.

OPEN DISTRIBUTED DATA MANAGEMENT

An on-line RDBMS fully supports an open client/server architecture that lets you transparently distribute applications and databases over networks of multiple heterogeneous workstations and/or computer systems. It includes a two-phase commit service to support distributed update transactions, as well as retrievals, across two or more servers. And it provides open interfaces for integrating third party tools as alternate clients and foreign data sources as alternate servers for a truly open computing solution.

ADAPTABLE WINDOWING TOOLS

An on-line RDBMS gives developers a set of window-based 4GL tools that are object-oriented, event-driven and portable. And it integrates these tools with the power of the programmable server. In addition, an on-line RDBMS gives users a set of window-based decision support tools that provide real-time access to live data with a highly intuitive graphical user interface.

ONLY ONE RDBMS DELIVERS ALL THESE FEATURES—TODAY

SYBASE preserves and protects your hardware and software investments while allowing your organization to grow. SYBASE gives you window-based decision support tools along with a powerful, integrated 4GL development environment; you write applications once and know that they're fully portable to a wide variety of platforms. And SYBASE provides an open client/server architecture that fulfills the promise of the on-line enterprise.

SYBASE. Architected from the outset as the on-line RDBMS.

The Oracle View

(We regret that Oracle did not respond to our invitation to take part in the third Sybase Forum. The accounting firm of Ernst & Young had not received Oracle's views on the Open RDBMS by the deadline.)

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THE SYBASE FORUM

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NEW PRODUCTS — HARDWARE

Processors

A high-performance memory upgrade designed to enhance Digital Equipment Corp.'s Decstation 3100 and Decstation 2100 to their 24M-byte capacity has been announced by Clearpoint Research Corp.

Clearpoint's DCME-D31 comprises 2M-byte modules that consist of 100-nsec, 1M-byte surface-oriented J-lead dynamic random-access memory devices, which are added in couples to accommodate the Decstation's interweaving architecture. The addition of DCME-D31/2MB memory modules reduces network access to the main server and provides self-sufficient operations as a diskless node in a workstation network, the vendor said.

The list price for the 4M-byte upgrade is $1,400; quantity discounts are available.

Clearpoint
35 Parkwood Drive
Hopkinton, Mass. 01748
508-435-2000

Point 4 Data Corp. has introduced a multiuser system that can run a Unix operating system.

The Mark 2500 uses a reduced intruction set computing R3000 CPU and an R3010 floating-point unit developed by Mips Computer Systems, Inc. It features a 64K-byte cache for instructions and a 64K-byte write-through cache for data. System memory can be expanded in 8M-byte increments to 48M bytes, according to the vendor.

The product offers support for industry-standard language processors and is supported by RISC/OS, an industry-standard AT&T Unix System V operating system for multiuser business applications.

The list price of the product is $55,000.

Point 4
15442 Del Amo Ave.
Tustin, Calif. 92680
714-259-0777

Data storage

A mass storage system designed for use with Digital Equipment Corp.'s Microvax 3100 and Vaxstation 3100 computer platforms has been announced by Digi-Data Corp.

The Gigastore 31XX product is compatible with all DEC utilities, including Copy, and allows users to write ANSI tapes for data interchange, the vendor said. The unit offers an average search time of three minutes and storage capacities up to 5.4G bytes on a single videocassette. Pricing starts at $3,095.

Digi-Data
8580 Dorsey Run Road
Jessup, Md. 20794
301-498-0200

A rack-mountable IBM 3480-compatible cartridge tape subsystem for connection to Digital Equipment Corp.'s HSC Vaxcluster storage controller has been announced by Systems Industries, Inc.

The SI2480 HSC Tape Subsystem is offered standard with an automatic tape cartridge stacker with either five or 10 cartridge bins. It has a 200M-byte-per-cartridge capacity and a maximum data transfer rate of 3M byte/sec.

List pricing for a master unit is $55,200 and $36,800 for up to three slave units.

Systems Industries
P.O. Box 789
Milpitas, Calif. 95035
408-432-1212

Epoch System's *optical-disc server*

Epoch Systems, Inc. has added an erasable optical disc library unit to its Epoch-1 Infinitestorage servers.

The product, manufactured for Epoch by Hitachi Ltd., features an automated on-line backup service and an on-line backing store to the servers' Winchester disk drives. The latter feature creates instantly available magnetic disk space, the vendor said.

The unit comes equipped with one optical drive and can hold up to 48 5¼-in. optical cartridges to provide a total capacity of 30.9G bytes. It can also be expanded to hold four drives at a cost of $14,000 per drive.

The Infinitestorage server is based on a hierarchical storage architecture that integrates optical disc storage as a transparent backup for magnetic disk drives.

Prices for servers that incorporate the optical disc unit begin at $158,500 for Model 31B, a 31.7G-byte server that includes a 30.9G-byte erasable optical disc library unit and a 760M-byte magnetic disk drive.

Additional magnetic disks and erasable optical library units can be added for the respective prices of $8,000 and $65,000.

Epoch
313 Boston Post Road West
Marlboro, Mass. 01752
508-481-3717

I/O devices

Jupiter Systems has announced the VX8, a Motorola, Inc. VMEbus display controller card for applications that require high-performance character, graphics and image display as well as windowing capabilities.

The board features 8 bit/pixel and provides a resolution of 1,280 pixels by 1,024 lines. The user has a choice of 256 simultaneous colors from a palette of 16 million.

List pricing is $4,950, with quantity discounts for OEMs and resellers.

Jupiter Systems
1100 Marina Village Pkwy.
Alameda, Calif. 94501
415-523-9000

Siemens Information Systems, Inc. has announced an interface that allows its nonimpact printers to connect to IBM System/34, 36 and 38 and Application System/400 computers to provide local and remote printing.

The Spur interface was designed primarily for use with Siemens' 2200 Model 2 Laser Printing System and its 2050 LED Printing System.

The cost for a hardware conversion to the Spur interface is approximately $10,000.

Siemens
Peripheral Systems Division
240 E. Palais Road
Anaheim, Calif. 92805
714-991-9700

Data General Corp. has introduced its D216+, D412+ and D462+ display terminals.

All three models were designed with an enhanced proprietary Unix emulation board that improves compatibility between DG's AOS/VS and Unix application environments.

Respective prices for the D216+, D412+ and D462+ are $445, $545 and $995.

DG
3400 Computer Drive
Westboro, Mass. 01580
508-898-4051

Power supplies

Harris Semiconductor has announced a monolithic power supply chip designed to convert 240V AC line voltage to a regulated 5V to 24V DC ouptut.

HV-2405E is an eight-pin integrated circuit that functions as a transformer, rectifier and three-terminal voltage regulator. It enables users to implement a single integrated circuit for handling 120V and 240V AC line sources, the vendor said.

Input voltage and frequency may vary from 18V to 264V (route mean square) or 48 to 440 Hz. The chip is being sold in 1,000-piece quantities for $2,930.

Harris
P.O. Box 883
Melbourne, Fla. 32901
407-724-3800

Maintenance equipment

Huntron Instruments, Inc. has introduced the Huntron DC Line Sentry Model 20, a device that monitors the voltage of suspect DC power supplies.

The product can monitor whether a power supply's voltage has gone above or below a designated range or if a power failure has occurred, according to the company.

Once a condition has been detected, the device will store the event until it is reset, thereby providing unattended monitoring.

DC Line Sentry Model 20 is slated to be available this month for a suggested unit price of $125.

Huntron
15720 Mill Creek Blvd.
Mill Creek, Wash. 98012
206-743-3171

KEDIT 4.0
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- **More than 100** XEDIT compatible commands and SET options, including the ALL command.
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- And much, much more

"While KEDIT remains true to its heritage in retaining compatibility with the mainframe XEDIT, it is also one of the most feature-packed PC text editors around."
PC Magazine, 10/31/88

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P.O. Box 532, Storrs CT 06268
(203) 429-8402

DOS Version: $150
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(includes DOS version)
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Demo version available.

*KEDIT is a trademark of the Mansfield Software Group, Inc.

MICRO BITS

Richard Pastore

Users: Lords of the jungle

They had him right where they wanted him. More than 20 personal computer dealers and distributors encircled one Ross Cooley, Compaq vice-president of sales and service. Cooley hunkered down in a small folding chair, girding himself for the onslaught.

Cooley had just slogged through a canned presentation to explain and justify Compaq's distribution strategies to this presumably tough audience, some of whom have suffered decimated margins partly at the hands of price-cutting, quota-boosting vendors like Compaq. You might think this first Fuji-sponsored dealer summit in Naples, Fla., would have turned into a bloodbath.

But nothing happened.

This missed opportunity illustrates dealers' fundamental inability to solve or even address their problems.

And by their inaction, dealers have unwittingly put their fortunes in the hands of the customers.

In fact, of all the questions launched at Cooley that morning, only one grazed the issues plaguing most dealers and dis-

Continued on page 41

Making pirates walk the plank

Controlling software acquisition demands creative solutions from firms

ANALYSIS

BY SALLY CUSACK
CW STAFF

Recent threats of litigation against user companies show that some organizations have failed in their attempts to control software piracy. Managers say that even the most sincere corporate efforts at standardization and control leave cracks through which unauthorized copies of software can slip.

But what to do about the occasional request for packages, perhaps special utilities or applications that an employee knows from experience at home or a previous job? "Standardization almost presents a Big Brother type of problem," said George Carr, vice-president of information systems at St. Luke's Episcopal Hospital in Houston. "Even when it is technologically feasible to monitor an individual's PC habits, users look askance at what they consider to be a violation of their privacy."

Standards must be set down, and organizations *must* be responsive to user requests, he emphasized. St. Luke's, an IBM shop with approximately 350 personal computer users, is working to meet user demands in the applications arena. Carr feels that disparity between software supply and demand encourages frustrated users to look elsewhere for solutions.

Continental Grain Co. in New York, with approximately 3,000 PC users across the corporation, has created a Technical Development Group to evaluate software and set standards.

"We supply our users with most major software applications," said Hilly Fuchs, Continental Grain's director of IS development. "If applications grow to the point that an add-on is needed, the user can go to the technical development staff and

Continued on page 40

It's the real thing?

Users and consultants list the following as key to standardizing personal computer software:

- **Establish clear corporate standardization policies and procedures.**
- **Educate end users on the hazards of using nonstandardized programs.**
- **Establish a group or division to monitor personal computer software acquisition and usage.**
- **Provide adequate applications to meet user needs.**
- **Carefully research packages before purchasing.**
- **Respond promptly to user requests.**
- **Closely monitor all portable computing platforms; clean disks and reload software before passing the machine to another user.**

LSI's Sparkit chips spark Sun clones

BY JAMES DALY
CW STAFF

MILPITAS, Calif. — Sun Microsystems, Inc. got a giant push toward its avowed goal of filling the world with clones of its workstation when LSI Logic Corp. recently announced a chip set that it says will help manufacturers duplicate Sun's popular Sparcstation 1.

The Sparkit is a package of seven integrated circuit chips compatible with Sun's reduced instruction set computing (RISC)-based microprocessor design, known as the Scalable Processor Architecture (Sparc).

Mountain View, Calif.-based Sun has publicly invited computer makers to clone its machines in an attempt to establish the Sparc architecture as the de facto standard in the heated RISC marketplace. Heavy competition already exists from other RISC chip manufacturers such as Intel Corp. and Motorola, Inc.

Analysts said that LSI hopes to repeat the success of Chips and Technologies, Inc., which shrank the inner workings of IBM's Personal Computer AT and sold them to computer makers en masse. The sudden influx of AT-compatible chips started a flood of inexpensive IBM clones and made millions for Chips and Technologies.

Potential savings

LSI's move could also dramatically lower the price for entry into the sizzling workstation market. The first machines based on the $1,327 Sparkit-25 chip set will cost about $8,000, an LSI spokesman said, adding that LSI expects Sun clones for under $5,000 by the end of the year. Sun is expected to lead that parade this summer with an updated version of its Sparcstation 1 that is expected to sell for around $5,000.

Six computer makers, including some large Asian manufacturers, are already designing around the Sparkit, an LSI spokesman said.

Two performance versions of the Sparkit were announced. The Sparkit-25 works at 18 million instructions per second (MIPS) and is intended for general-purpose workstations. Sample versions will be ready in June, and volume shipments are expected by the third quarter. The Sparkit-40 is intended for more compute-intensive applications and will operate at up to 29 MIPS. It will be available in the second half of the year.

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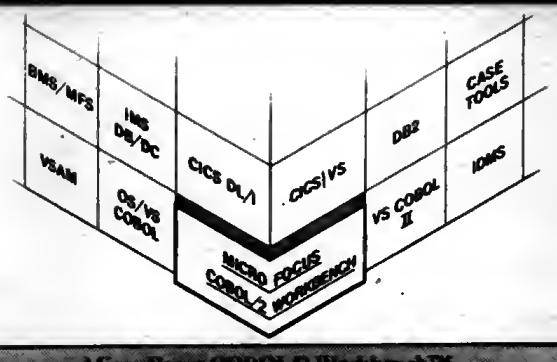

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Burger, fries and project management

McDonald's finds that implementing groupware can be easier than getting people to use it

ON SITE

BY CHARLES VON SIMSON
CW STAFF

OAK BROOK, Ill. — Looking for a way to bring more discipline to his group's planning process, Jim Sappington found himself in a situation that is familiar to anyone who has looked at project management software.

"It all looked great," said Sappington, senior manager of the financial systems group at McDonald's Corp. "But I couldn't find something useful to do with it." The problem, he explained, was that while several vendors offered pieces of the calendar, to-do list, report writer and electronic mail functionality he was looking for, none offered a collected group of functions that had been integrated into a single package.

Finally, Sappington settled on software from Information Research Corp., a Charlottesville, Va., developer of a group-oriented project management system and report writer called Syzygy. The DOS-based software incorporates all the functions Sappington's accounting systems group needed, including the ability to easily incorporate information from the Lotus Development Corp. 1-2-3 and Microsoft Corp. Excel spreadsheets.

Sappington saw Syzygy's primary value over other products as the collection of several features in one package. "It allows us to communicate effectively as well as take care of our own personal projects," Sappington said. "Products like Lotus Agenda really only address one part of the planning process."

The system is currently being used by five accounting systems developers which are linked over Novell, Inc. Netware. The five are accountants who support information systems for the financial and accounting groups at McDonald's. Once tax season is over and the team has more time, they will begin to roll the system out to other parts of the company. The first targeted group is about 20 people in a different financial systems function.

What project management software does, in general, is provide a flexible framework for scheduling tasks and appointments. At the most basic level, a typical system allows a manager to input several tasks under a name and have the name appear, much like a spreadsheet, when any one of the tasks is called up on the computer.

Most of these products offer a number of different features and levels of complexity. Syzygy includes a shared calendar feature, support for E-mail, project and task scheduling and organization and a database query report writer. All of the features can be shared between the personal computers running the software.

Agenda change

While managers such as Sappington said that there is an ever-increasing need for such software as organizations flatten and reporting structures become less formal, products to date have not done very well in the marketplace. Lotus Agenda, the most prominent entry, is being revamped with an improved interface as sales lag.

While Sappington said that the Syzygy interface is "much more structured" and hence easier to use, he acknowledged that it does not have a spreadsheet's advantage of being immediately necessary. "You still have to force people to use it to get them started," Sappington said. "Once they get going, everyone uses it differently, and some far more than others."

However, while Information Research has done some good work on the interface, it is not a leap beyond Agenda. It does, however, have some very powerful additional features, including a menu-driven report writer that allows for the creation of standard queries to generate reports from database files.

"That is the most powerful feature," Sappington said. "It allows us to better integrate information from a number of sources into our planning and goal setting process. As far I see it, that's what this whole area is driving at."

Digital video looks to commercial markets

BY ELLIS BOOKER
CW STAFF

Digital video bobs at the confluence of three technologies: the video recorder/player, compact disc/read-only memory (CD-ROM) and the personal computer.

Promising commercial digital video applications for education and on-line instruction — not to mention games — are being readied, although existing applications are few and far between.

Meanwhile, as hardware makers point to the declining cost curve of the underlying digital video technologies and software developers point to the "inevitability" of multimedia computing that includes high-resolution video and sound, standards for both single-frame and full motion video and digital-stereo formats are progressing (see sidebar).

Intel Corp. is perhaps the furthest along of any firm with its offering, dubbed digital video interactive (DVI). The proprietary technology came to Intel in 1988 by way of the David Sarnoff Research Center in Princeton, N.J.

In a recent address in Chicago, David L. House, the president of Intel's microcomputer components group, said that DVI must become part of the computing fabric because "the limitation in PCs today is ease of use." Computers in the year 2000 will be capable of voice input/voice output, full-motion color video and stereo sound, he said. By that time, DVI will be available on microprocessors costing a few dollars apiece rather than the current full-board $2,000 product. The effect, he said, will be to make these future platforms available to a mass audience.

House also made some specific promises for Intel's DVI and said that the video authoring system, which now runs under Microsoft Corp.'s MS-DOS, would be ported to Windows and OS/2 as well as Unix. Support for Windows is scheduled for next year, he said.

Andersen Consulting in Chicago was one of the dozen or so companies to jump on the DVI bandwagon last year. The information systems consulting company released its Process Analysis Workbench, a way of recording a task, segmenting it and then adding graphics, text and audio commentary to illustrate to a client how to optimize the procedure.

"Before DVI, we were using a videotape, a PC with a spreadsheet and a stopwatch," said Reinhard Ziegler, senior manager for change management service at Andersen Consulting's Dallas office, where Andersen is creating multimedia applications that it calls "performance support systems."

According to Nick Arnett, president of Multimedia Computing Corp., a market research firm in Santa Clara, Calif., about

Continued on page 41

Sight & sound

Several standards bodies are looking into digital video formats. Among these groups are the following:

• **The Moving Pictures Expert Group (MPEG)**, a joint International Standards Organization (ISO) and Consultative Committee for International Telephony and Telegraphy (CCITT) body, is developing an international standard for digital video, compact-disc-quality stereo and control information (i.e., software programs).

Those familiar with MPEG said the video working group is the furthest along and is due to have a draft standard in the fall. The standard reportedly will call for a 900K bit/sec. video channel, a 300K bit/sec. audio channel and a 30K bit/sec. "control" channel.

The total bandwidth of the proposed standard is 1.5M bit/sec., the same as that for a T1 communications path.

• **Joint Photographic Experts Group (JPEG)**, a companion ISO/CCITT body, is working on a single-frame digital video standard. In late February, C-Cube said that its chip set would be compatible with the soon-to-be-ratified JPEG standard.

ELLIS BOOKER

Pirates

FROM PAGE 37

make a request."

Continental Gram stocks a significant amount of software on the shelf; according to Fuchs, there is seldom a user inquiry that cannot be immediately fulfilled. When that does occur, the technical development staff researches on-file periodicals and industry evaluations on the product before making a decision to supply the package.

Keep it in line

"We're not necessarily opposed to onesy-twosy-type purchases as long as it doesn't get out of hand," Fuchs commented. "If we received a significant number of requests for a certain product, we would conduct a full-scale evaluation."

Alex Kask, an officer with the Microcomputer Manager's Association and a senior executive at Ernst and Whinney in New York, speculated that the only way to totally control the issue is to move to a dumb terminal and mainframe setting.

"Of course, no one wants to do that. And people are always going to bring games and programs in from home. It's a given," he said.

Kask said he is strongly in favor of using standardized, site-licensed products and keeping careful watch on the user community. He advocates several methods of keeping a clean computing environment. One of these is monitoring the use of laptops within an organization. At Ernst and Whinney, when a laptop is returned to the IS department, the disk is wiped clean and the software is reloaded from a set of standardized disks.

"It's basically an education process for the end users," said David Cearly, program director at Gartner Group, Inc., a Stamford, Conn., market research company. Noting that the days of haphazard software installation are over, Cearly listed terminate-and-stay-resident programs and other software packages that affect extended memory functions as potential problems in today's networked PC environments.

"If the extended memory scheme is inadvertently disrupted, the system software can topple like a house of cards," he said.

Users must also be warned that even published products from large, reputable software houses are not immune to virus infiltration. Every package should be checked prior to installation, Kask said.

Key Tronic seeks lighter laptops

BY RICHARD PASTORE
CW STAFF

SPOKANE, Wash. — Keyboard manufacturer Key Tronic Corp. has acquired rights to portable technology enabling notebook computers based on the Intel Corp. 80386SX chip to weigh less than five pounds, the company said late last month.

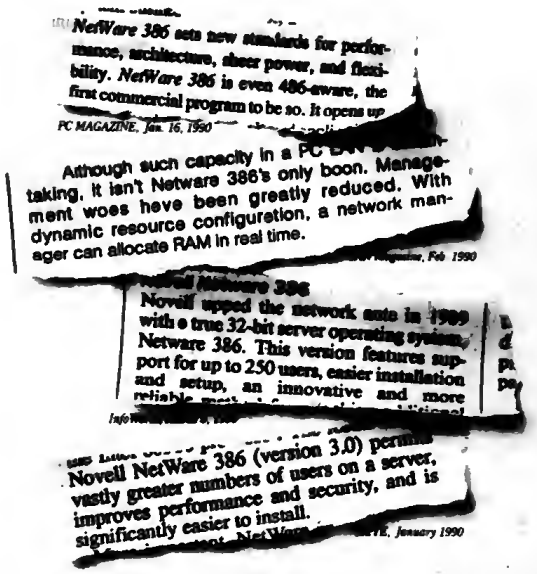
Most portable computers classified as "notebook" machines weigh between five and seven pounds. Compaq Computer Corp.'s hot-selling LTE line weighs six pounds. Sharp Corp. announced one of the industry's few four-pound laptops two weeks ago.

The technology, acquired from developer Selsys Corp. in Boulder, Colo., will allow the lightweight units to operate on standard AA batteries.

Key Tronic plans to license the notebook packaging and design to various OEMs, who would incorporate the design into their own offerings.

According to Key Tronic President Fred Zirkle, initial discussions with OEMs have focused on providing the notebook machine with such sophisticated features as IBM Video Graphics Array displays, communications options and power management.

Key Tronic is changing its role from a components manufacturer to that of a technology packaging vendor. The firm said the first unit will be released early in the fourth quarter.



After everything that's been said about NetWare 386,

©1990 Novell Inc., World Headquarters, 122 East 1700 South, Provo, Utah 84606 (801) 379-5900

Pastore

FROM PAGE 37

tributors. There was nothing about how to boost margins. Nothing about overdistribution. Nothing about runaway discounting and the proliferation of vendor price cuts.

The balance of the dealer inquiries dealt with future products — i.e., "What else do you have that we can sell?"

Sure, both dealers and vendors have been giving lip service to calling a truce on the price war and stabilizing the channel. But retailers, distributors and even vendors I've talked to all harbor serious doubts that any progress will be made.

"As long as there are two dealers in a city, there will be discounting." I've heard this refrain ad nauseum from executives at Computerland, Tandy and Compaq as well as some of the folks in Naples last month.

Dealers blame their dilemma on vendors' penchants for overdistributing, raising quotas and cutting list prices. Both dealers and vendors blame the discount-worshipping customers who play one retailer off another as if shopping for Chevys.

Reeling from blood-red 1989 bottom lines, retailers Businessland and Computerland have huffed and puffed and stamped their feet this year. Businessland has imposed a discount cap and vows not to bid on contracts that demand deeper cuts. Computerland also says it will eschew deep discounts.

Who cares? If Businessland or Computerland says no, customers can catch the bus to the Microage store, which will likely dive at the chance to make a better deal. That's the law of the jungle, and no amount of dealer posturing or vendor incentives will change it.

The only concern users should have is how many of the rabid discounters will price themselves out of business and be replaced by videotape rental shops and TCBY yogurt pushers. Even if that happens, though, there's always Sears Brand Central, which is now considering carrying Compaqs.

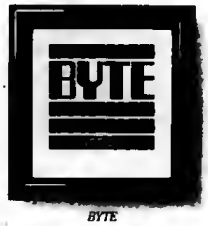
One survival tactic a few dealers are embracing is to offer advanced value-added services for higher fees. A market exists for these services; users know they can't get that level of help from Sears, Radio Shack or 7-Eleven. Several PC managers have told me that price is important but that they would pay more to get good service.

Customers like these could clear a path to dealer profitability faster than a machete. But until dealers gear up to cater to these folks, it's going to be a jungle out there — and the customer will be its lord.

Pastore is a ***Computerworld*** *staff writer.*

InfoWorld
1989 Product of the Year

LAN Magazine
1989 Product of the Year



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NOVELL

For network solutions, you should be seeing red.

Digital video

FROM PAGE 39

130 developers now are working with Intel's DVI.

Arnett noted that Intel's original DVI offering is "asymmetrical," meaning "more time or computing power is spent inputting the video than getting it out again." Thus, while the PC-based authoring system is interactive, the images typically reside on a CD-ROM drive and require a large computer to compress them. Last year, Intel introduced a real-time, or "symmetrical," version of DVI. However, this product cannot generate the breathtakingly high resolution of the asymmetrical system, Arnett said.

Video compression on the fly is what C-Cube Microsystems in San Jose, Calif., is pursuing. The 2-year-old firm announced its first product in February.

Yet another approach, this one not relying on a PC interface, is being undertaken by Los Angeles-based American Interactive Media, Inc. Formed in 1986 by Philips International BV and Polygram International in London, the company hopes its compact disc interactive (CDI) project will result in CDI titles early next year.

According to a company spokeswoman, CDI will rely on CD player technology developed jointly by Sony and Philips. In operation, a CDI player will be hooked directly to a TV set.

NEW PRODUCTS

Systems

Raritan Computer, Inc. has announced its Masterconsole, a device that controls up to 16 IBM Personal Computers, XTs, ATs or compatibles.

The product provides centralized access, control and maintenance of multiple file servers, communication servers and other PC local-area network resources. It can function as a keyboard/monitor signal multiplexer and includes keyboard/monitor cables for connecting up to 16 CPUs. Each computer can be accessed by pressing the electronic switch on the product's front panel.

The price for a Masterconsole with 16 sets of cables is $995.

Raritan
Suite 1
10 Ilene Court
Belle Mead, N.J. 08052
201-874-4072

Software utilities

Data Access Corp. has announced an IBM Systems Application Architecture/Common User Access-compliant SQL report writer.

Vantagepoint allows reports to be defined through a point-and-select interface modeled after the CUA standard interface of IBM's SAA and then translated into SQL scripts and saved for future use. The product's SQL feature enables users to access, extract and manipulate data; create and delete tables; and add, change or delete rows and columns, the vendor said.

Vantagepoint costs $295 for a single user DOS version and $595 for a multiuser DOS version.

Data Access
14000 S.W. 119th Ave.
Miami, Fla. 33186
305-238-0012

Chromatics, Inc. has introduced X Window System support for its CX2000 graphics workstation series.

The X Window System offers system development and other off-line tools provided with many host windowing packages.

The X Window System software is slated for release in June for a price of $300.

Chromatics
2558 Mountain Industrial Blvd.
Tucker, Ga. 30084
404-493-7000

KDS Corp. has announced KDS3.6, an updated release of the KDS frame-based expert system shell with a blackboard for IBM Personal Computer XT, AT, Personal System 2 and compatible microcomputers.

KDS3.6 features the ability to save and restore consultations in progress on a network and offers support for BSAVE (IBM Color Graphics Array only), GX1 and GX2 graphic picture file formats, the vendor said.

A single workstation development license that includes a runtime module for testing sells for $1,495.

KDS
934 Hunter Road
Wilmette, IL 60091
708-251-2621

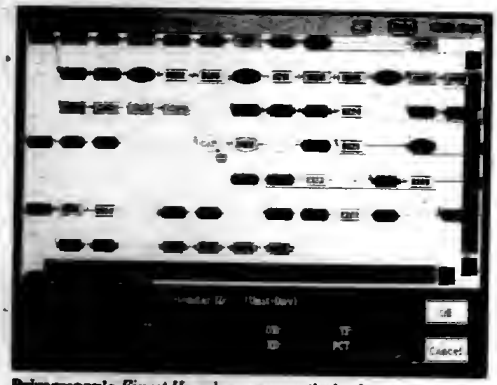
Software applications packages

Supportmagic, a software package developed for the corporate environment, has been announced by Magic Solutions, Inc.

The fully integrated, single-module system is written in C and uses Btrieve, a low-level database from Novell, Inc., to provide advanced speed and file capabilities, the vendor said. The product operates via pull-down menus and windows and includes an on-line manual and logical screen layouts. It runs on local-area networks such as Novell, 3Com Corp., IBM, Banyan Systems, Inc. and any Netbios-compatible network with color monitors and MS-DOS 2.1 or higher.

An evaluation copy of the program is available for $50.

MSI
610 Vermeulen Place
Franklin Lakes, N.J. 07417
201-891-6383



Primavera's *Finest Hour has many methods of resource leveling*

Primavera Systems, Inc. has begun shipping Version 4.0 of its Finest Hour scheduling software for short projects.

Version 4.0 features multiuser capability, a graphical user interface for building networks, a complete set of drawing tools for customizing plots and Adobe Systems, Inc. Postcript output availability. The product also offers resource leveling by shift, contiguous or interruptible activity scheduling, flag symbols and connector blocks to excluded activities.

Finest Hour 4.0 operates under Novell, Inc.'s Advanced Netware 2.1 and higher versions and is priced at $5,000.

PSI
Two Bala Plaza
Bala Cynwyd, Pa. 19004
215-667-8600

Ocron, Inc. has introduced its Omniplus Optical Character Recognition software.

The product enables users of desktop scanners to automatically scan and convert printed documents of any font, typestyle or Western language into computer-readable forms at more than 99% accuracy, the vendor said.

Omniplus operates under Microsoft Corp. Windows on IBM Personal Computer AT Intel Corp. 80286- and 386-compatible computers without the need for additional hardware or a large memory addition.

The software package is slated to be available next month for $795.

Ocron
Building 36
3350 Scott Blvd.
Santa Clara, Calif. 95054
408-980-8900

Macintosh products

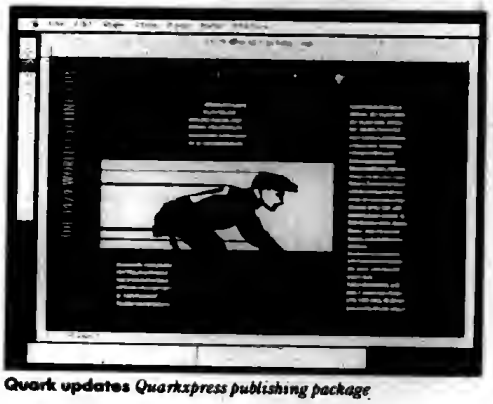
Metamorphosis Version 1.0, a utility designed to convert any Adobe Systems, Inc. Postscript font into editable outline formats, has been announced by Altys Corp.

The product enables users of Apple Computer, Inc.'s Macintosh computers to manipulate and modify Postscript type outlines in drawing, type design and graphics effect programs. It uses an Adobe Postscript interpreter to convert Postscript fonts into editable outlines in three formats, the vendor said.

The product will run on Macintosh Plus or higher computers with at least 1M byte of random-access memory. A printer with a Postscript interpreter is also required.

Metamorphosis costs $295.

Altys
720 Ave. F.
Plano, Texas 75074
214-424-4888



Quark updates *Quarkxpress publishing package*

Quark, Inc. has announced Quarkxpress 3.0, an updated version of its publishing software product line designed for Apple Computer, Inc. Macintosh systems.

The software package includes measurement, page and document layout palettes as well as a library for storing frequently used items. The product enables text and graphic items to be grouped for simultaneous manipulation, and a color trapping feature provides precise color printing, the vendor said.

Quarkxpress is slated to ship this month for a suggested retail price of $795.

Quark
Suite 100
300 S. Jackson
Denver, Colo. 80209
303-934-2211

Andyne Computing Ltd. has announced GQL Version 2.0, a graphical interface that enables users of Apple Computer, Inc. Macintosh systems to access host database information.

With Version 2.0, Macintosh users can utilize SQL functions through graphical interaction without viewing an SQL statement, the vendor said. The product features query and attribute style windows and user-defined executive buttons.

The GQL family consists of GQL/User ($295), GQL/Admin ($1,995) and GQL/Design ($995). Owners of GQL products can upgrade to Version 2.0 for $25 per package.

Andyne
544 Princess St.
Kingston, Ont.,
Canada K7L 1C7
613-548-4355

Board-level devices

A 16-bit graphics board designed to combine the functions of two IBM Video Graphics Array cards on a single board has been announced by Colorgraphic Communications Corp.

Called Dual VGA+, the product allows multiple screens of up to 800 by 600 dot/in. resolution to be displayed by a single IBM Personal Computer AT, Personal System/2 or compatible, including Intel Corp. 80386-based machines.

The Dual VGA+ board is priced at $900.

Colorgraphic
5388 New Peachtree Road
Atlanta, Ga. 30366
404-455-3921

Cardinal Technologies, Inc. has introduced a 16-bit IBM Video Graphics Array graphics adapter designed for compatibility with the register and BIOS levels of the VGA standard.

Model VGA 600 offers 512K bytes of video memory, enabling users to choose from resolutions up to 132 columns or 50 lines and increased graphics resolutions of up to 1,024 by 768 pixels. The adapter can also display 256 colors simultaneously from a palette of 256,000.

Other features include graphics utilities, extended mode drivers and utility programs with video-mode selection and diagnostics utilities.

VGA 600 fits into the expansion slot of an IBM Personal Computer XT, AT, Personal System/2 Model 30 or compatibles.

The product is being sold through national authorized distributors and dealers for $389.

Cardinal
1827 Freedom Road
Lancaster, Pa. 17601
800-233-0187

A line of IBM Micro Channel Architecture packaging panels designed for use with the IBM Personal System/2 MCA bus has been announced by Augat, Inc.'s Interconnection Products Group.

The panels are offered in Wire Wrap and Unilayer II logic styles in 16- and 32-bit versions. Wire Wrap boards are available in the company's Fastpak and Hi-Pak models in standard and extended board heights.

Pricing for one to four boards starts at $441 for standard panels; extended height units cost $772.

Augat
33 Perry Ave.
Attleboro, Mass. 02703
508-222-2202

There are two kinds of innovations in the computer business. The ones you just talk about. And the ones you actually use.

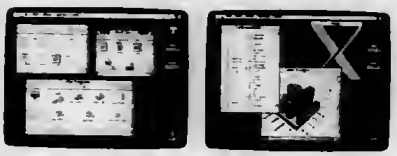
Introducing 1

Apple was the first to combine the power of computers with the power of humanity. The 53 innovations in the new Macintosh IIfx are designed to make that combination more powerful than ever.

Introducing the computer you've all been waiting for. It's just not the company you've been expecting it from.

The remarkable new Macintosh® IIfx from Apple Computer, Inc.

While others have just been talking about the personal computer of the future, we've actually been building it.



Apple's latest version of UNIX, A/UX 2.0, lets you run UNIX, UNIX X Window System and off-the-shelf Macintosh programs all at the same time. 53 innovations for Apple. Hundreds more choices for you.

A computer that combines astonishing levels of speed, performance and flexibility with the power of thousands of proven second- and third-generation programs that all work in the same graphic, consistent, human way.

And you can put it on your desk and actually use it today.

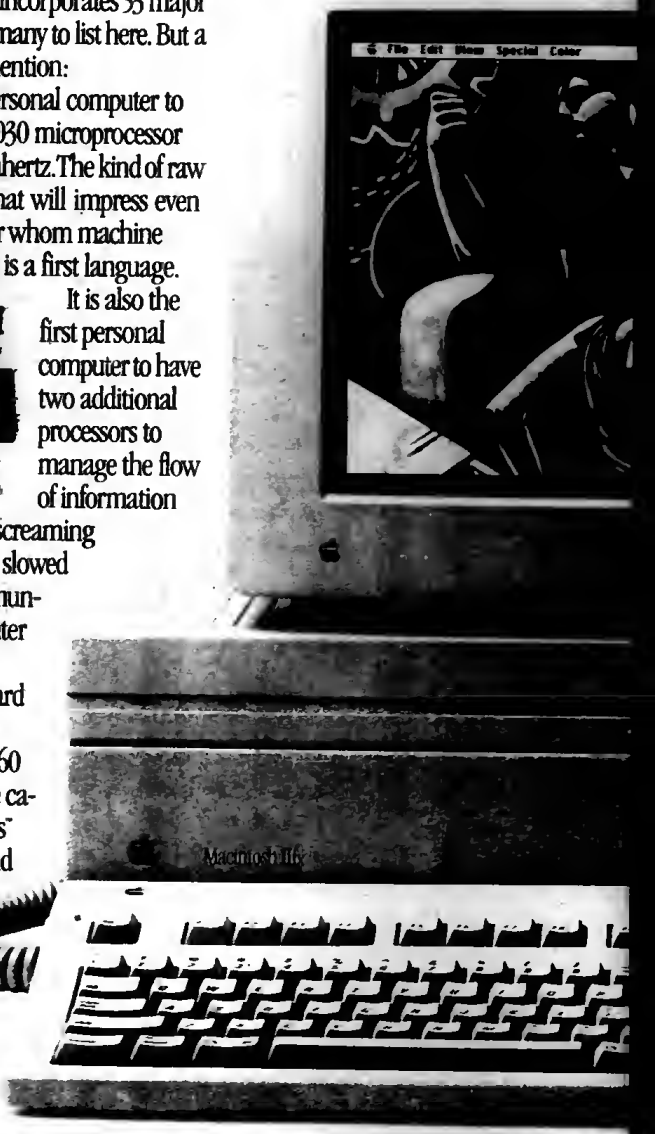
The IIfx alone incorporates 53 major innovations — too many to list here. But a few merit special mention:

It is the first personal computer to offer a Motorola 68030 microprocessor running at 40 megahertz. The kind of raw processing power that will impress even those individuals for whom machine language is a first language.

A pair of new video cards turns 16 new colors from Apple Labs into 16,776,960 more colors you can actually see. But only on a Macintosh.

It is also the first personal computer to have two additional processors to manage the flow of information inside. So that that screaming 68030 chip won't be slowed down by the more mundane tasks of computer housekeeping.

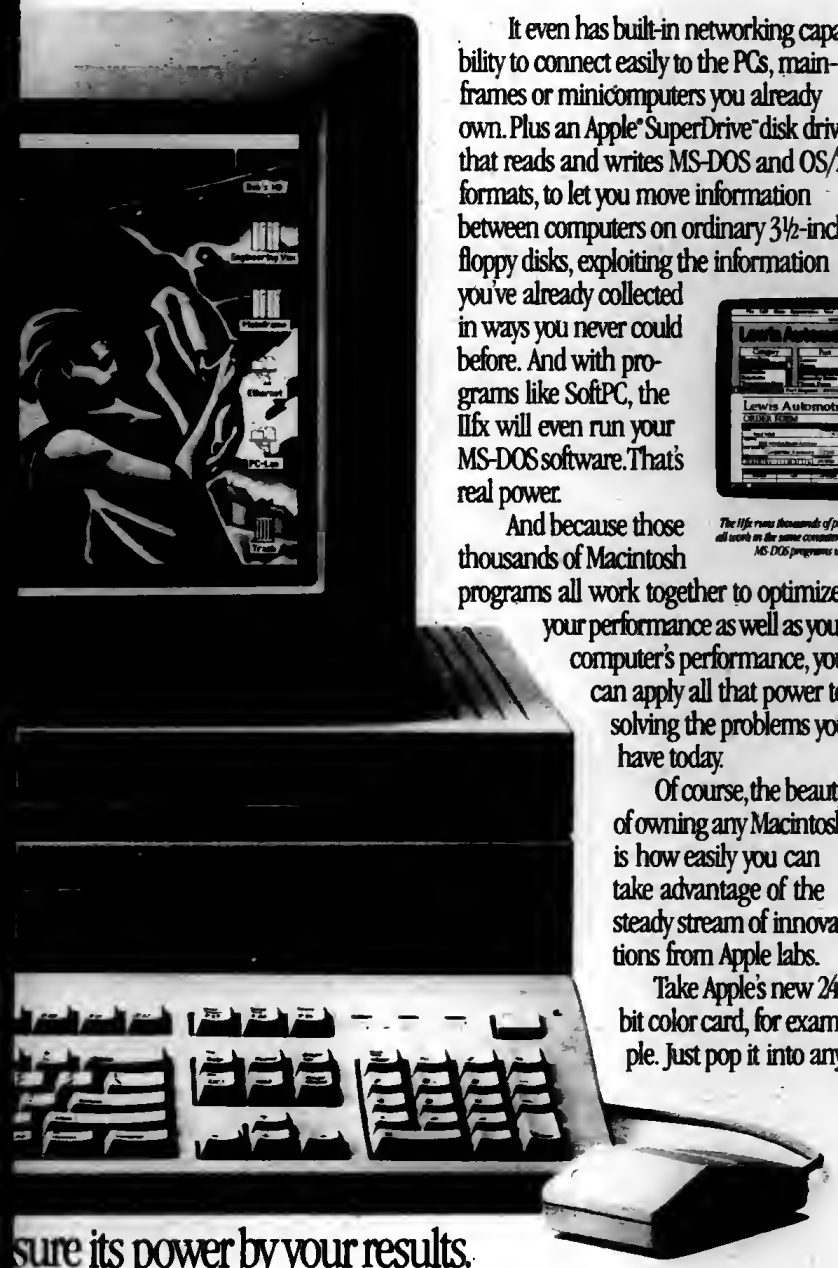
It comes standard with 4 megabytes of memory and up to 160 megabytes of storage capacity. And six NuBus™ slots to let you expand its awesome capabilities even more.



The new Macintosh IIfx. Me

National Software Testing Laboratories ran benchmarks comparing the Macintosh IIfx with the IBM Model 70 with running Microsoft Excel, Aldus Pagemaker and Adobe Illustrator 88T, found the IIfx was 34% to 270% faster running these three popular programs, doing the things you normally do in business. In the same tests, the IIfx was also faster than the Compaq 386 35. The full NSTL test reports are available on request. © 1990 Apple Computer Inc. Apple, the Apple logo, Macintosh and A/UX are registered trademarks, and SuperDrive and The power to be your best are trademarks of Apple Computer Inc. Adobe Illustrator is a registered trademark of Adobe Corp. Pagemaker is a registered trademark of Aldus Corp.

03 of the latter.



It even has built-in networking capability to connect easily to the PCs, mainframes or minicomputers you already own. Plus an Apple® SuperDrive™ disk drive that reads and writes MS-DOS and OS/2 formats, to let you move information between computers on ordinary 3½-inch floppy disks, exploiting the information you've already collected in ways you never could before. And with programs like SoftPC, the IIfx will even run your MS-DOS software. That's real power.

And because those thousands of Macintosh programs all work together to optimize your performance as well as your computer's performance, you can apply all that power to solving the problems you have today.

Of course, the beauty of owning any Macintosh is how easily you can take advantage of the steady stream of innovations from Apple labs.

Take Apple's new 24-bit color card, for example. Just pop it into any modular Macintosh and you'll have the ability, in any program, to work with up to 16.8 million colors (roughly 16,776,960 more than you'll see on your PCs today).

Or slip in Apple's new graphics accelerator card and see those same colors plus lightning redraw speed.

You can even have the benefits of Macintosh in a UNIX® environment. Apple's latest version of UNIX for Macintosh — A/UX® 2.0 — lets you run UNIX programs, UNIX X Window System programs and off-the-shelf Macintosh personal productivity software *at the same time.*

So if you're ready to start using innovations instead of just hearing about them, get your hands on a Macintosh. The computer with the power to surprise you. The power you buy a computer for in the first place. The power to be your best.

The IIfx runs thousands of proven Macintosh programs that all work in the same convenient, intuitive way. It can even run MS-DOS programs with no extra hardware.

The most powerful personal computer is the one people actually use. But just for the record, the IIfx blows the windows off the fastest 486 PC in overall performance tests.

The power to be your best.™

sure its power by your results.

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The power to be your best, no matter what you do best.

From the most affordable Macintosh Plus to the extraordinary new Macintosh IIfx — Macintosh gives you more power to do more things more easily than any other personal computer system in the world. The only question is, how much power do you want?

It may be difficult for you to imagine Macintosh® as the world's most powerful personal computer system.

But this is, after all, the year when they're actually tearing down the Berlin Wall.

When they're tossing around words like "democracy" and "freedom" in *Pravda*.

When millions of people are looking at the way things work and deciding another system just might work better.

What a perfect opportunity to actually try a Macintosh. You'll find a Macintosh for every job, every person, every enterprise and every budget. All different. But all very much the same.

They all run thousands of programs that work in the same graphic, intuitive way. So you can learn the basics of all of them simply by learning one.

They all run the same software. So when you move from one Macintosh to another, you won't have to replace all your programs.

They all have built-in networking. So you can integrate Macintosh with your mainframe, mini and personal computer systems. And bring their vast information resources to your desktop with the point-and-click simplicity of Macintosh.

Apple LaserWriter® II Printers

Apple Hard Disk Drives *AppleCD SC™ Drive*

Apple Scanner

With dozens of Macintosh "plug & play" peripherals, setting up a Macintosh system is as easy as using one. And your other PCs can use Apple's famous LaserWriter II printers, too.

And with innovations like the Apple® SuperDrive™ disk drive built into most of them, you can move information between a Macintosh and your other PCs on a standard 3½-inch floppy disk. Or even run MS-DOS programs with no extra hardware.

No other computer system in the world gives you so much power to do so many things so quickly and so easily.

So what do you say? If all kinds of people can work together side by side, why not all kinds of computers?

All we ask is that you give Macintosh a try. Then, you'll save the money you would spend trying to squeeze the advantages of a graphic interface out of computers that aren't designed for it. And have Macintosh computers, which are.

Then, you won't have to wait years to see if other systems ever deliver on their promises. And have Macintosh, which delivers on them today.

Then, you'll have the power everyone in the world is looking for. The power you can use right now. The power to be your best.

The power to be your best.™

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   - 70. Mining/Construction/Petroleum/Refining/Agric.
   - 80. Manufacturer of Computers, Computer-Related Systems or Peripherals
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   - 22. Dir./Mgr. Tech. Planning, Adm. Svcs. Data Comm. Network Sys. Mgt. Dir./Mgr. PC Resources
   - 23. Dir./Mgr. Sys. Development, Sys. Architecture
   - 31. Mgrs. Supvr. of Programming, Software Dev.
   - 32. Programmers, Software Developers
   - 89. Sys. Integrators/VARs/Consulting Mgt.
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   - 12. Vice President, Asst. VP
   - 13. Treasurer, Controller, Financial Officer
   - 41. Engineering, Scientific R&D, Tech. Mgt.
   - 51. Sales & Mktg. Management
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   - C. Microcomputers/Desktops
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   - E. Local Area Networks
   - F. No Computer Involvement

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   - 69. Communications Systems/Public Utilities/ Transportation
   - 70. Mining/Construction/Petroleum/Refining/Agric.
   - 80. Manufacturer of Computers, Computer-Related Systems or Peripherals
   - 89. System Integrators, VARs, Computer Service Bureaus, Software Planning & Consulting Services.
   - 90. Computer/Peripheral Dealer/Distr./Retailer
   - 75. User: Other _____
   - 95. Vendor: Other _____ (Please specify)
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   - **IS/MIS/DP MANAGEMENT**
   - 10. Chief Information Officer/Vice President/Asst. VP IS/MIS/DP Management
   - 21. Dir./Mgr. MIS Services, Information Center
   - 22. Dir./Mgr. Tech. Planning, Adm. Svcs. Data Comm. Network Sys. Mgt. Dir./Mgr. PC Resources
   - 23. Dir./Mgr. Sys. Development, Sys. Architecture
   - 31. Mgrs. Supvr. of Programming, Software Dev.
   - 32. Programmers, Software Developers
   - 89. Sys. Integrators/VARs/Consulting Mgt.
   - **OTHER COMPANY MANAGEMENT**
   - 11. President, Owner/Partner, General Mgt.
   - 12. Vice President, Asst. VP
   - 13. Treasurer, Controller, Financial Officer
   - 41. Engineering, Scientific R&D, Tech. Mgt.
   - 51. Sales & Mktg. Management
   - **OTHER PROFESSIONALS**
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   - C. Microcomputers/Desktops
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DATA STREAM

Ely Lurin

Supporting details

Network equipment is becoming more sophisticated each year. Multiplexers have evolved to become network control devices that manage the network configuration and adapt to the transmission environment. Networks are increasing in size and significance to the corporation. All of this has increased the importance of support for network equipment to the communications manager.

Support is quite complex. It includes field services such as installation, technical manuals, training, network design assistance and the Help desk. Codex estimates that support is as much as 20% to 30% of the cost of network equipment.

Users also consider support very important. However, despite the large percentage of network equipment cost that is dedicated to support, the users are still not completely satisfied.

Norm Austin, network operations integration manager at Boeing Computer Services, says he feels that vendor support is absolutely critical for the purchase of network equipment. Despite the fact that his firm is one of the most sophisticated users of data networks in the U.S. and has its own network engineering design group, it still

Continued on page 51

Unstable PBX market is boon to AT&T's Definity

ANALYSIS

BY JOANIE M. WEXLER
CW STAFF

With acquisition and shakeout in the private branch exchange market catapulting vendor stability to the top of user priority lists, stalwart AT&T is receiving high marks from users and industry analysts one year after rolling out its digital Definity PBX.

The game of musical chairs that PBX vendors have been playing over the last few years in what is now largely a replacement market left one-third of 1988's switch makers unseated in 1989 and is forecast to eliminate up to another 50% by the mid-1990s, according to Dataquest, Inc., a market research firm in Cupertino, Calif.

In such an unstable climate, it is no wonder that users tout AT&T's durable stature and investment-protecting strategy.

Pleasure

However, Definity users also reported good experiences with the company's training and support.

"AT&T has been very supportive, and ours has been a very successful implementation," noted Anne Austin, a senior systems analyst at The Foxboro Co., a Foxboro, Mass.-based maker of industrial measurement instrumentation. "AT&T also provided the best training I've ever experienced."

Austin installed a Definity Generic 2 serving 2,500 users in the company's corporate headquarters one year ago and is cutting over another switch early this month at a remote site, also in Foxboro, to support 850 users.

AT&T said that over the past 12 months it has shipped 1,200 units of the Definity voice/data switch, which blends the architectures of the company's System 75 and 85 PBXs and reportedly protects about 90% of an upgrading customer's investment. The Generic 1 model supports 40 to 1,600 lines, while the Generic 2 supports up to 30,000 lines.

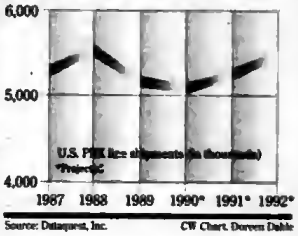
Ken Starkey, associate director of communications at brokerage firm Bear Stearns & Co. in New York, has installed seven Generic 1s and has three more on deck. "Since most of the PBXs are feature-rich, our choice was based more on the reliability of AT&T," he noted.

Eric Schmiedeke, a director at Eastern Management Group, a market research firm in Parsippany, N.J., concurred that "vir-

Continued on page 51

Buy-cycle

Although it is now considered a level replacement market, PBX sales are expected to pick up in 1991 when the traditional seven-year life cycle for PBXs ends



Source: Dataquest, Inc. CW Chart: Doreen Dable

Document management crosses net boundaries

BY ELISABETH HORWITT
CW STAFF

FAIRFAX, Va. — Document management software announced by Network Management, Inc. (NMI) is said to allow users to access documents on local-area network file servers that may reside anywhere on a corporatewide system of geographically distributed LANs.

Lanfolio servers are dedicated Intel Corp. 80386 or 80286 machines with database backends that run NMI document management software on top of Novell, Inc.'s Netware. NMI will provide support for other network operating systems, such as Microsoft Corp.'s LAN Manager, in the future, according to the company's LAN product manager, John Didner.

Lanfolio systems communicate with one another in order to keep track of the location of a given file resource so that user and application requests can be routed to the right server, whether it is on a local or remote LAN, Didner said. The system also keeps records of the application that generated each file and calls up the right application to access whatever file a user requests, he added.

A key Lanfolio feature is the ability to interface multiple users to a given "slot" that Netware regards as belonging to only one user. A Netware server can assign a maximum of 250 slots, limiting the number of users that can access files on a given server, Didner said. Lanfolio does away with that limitation, making the files of various servers accessible to thousands of users within a corporation, whether or not they reside on the same LAN as a given server, he added. This eliminates the need to locate files close to a given user population or duplicate files for different user group consumption, Didner said.

The product also provides indexing, search and lookup capabilities, which protect inexperienced users from the need to "map drives or network paths or know their way around a DOS file structure," Didner said.

Lanfolio keeps track of multiple disk volumes and file servers and can manage files generated by any LAN application, including spreadsheets and image documents, NMI said. The product is scheduled for release in the second quarter.

New Version!

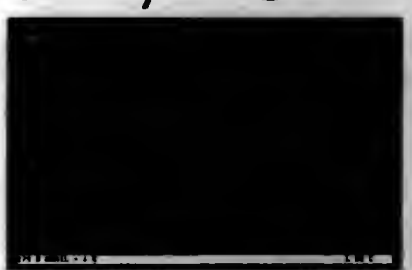
Zero Learning Curve

SPF/PC® 2.1

The MVS programmer will feel right at home using SPF/PC, the only PC editor functionally equivalent to editing on the IBM mainframe with ISPF/PDF, Release 2, Version 2.

SPF/PC fills the mainframe user's needs with a familiar environment, commands, large file support and micro-to-mainframe file portability. SPF/PC also offers:

- *true split screen*
- *command stacking*
- *43-line EGA*
- *picture strings*
- *online help*
- *binary editing*
- *directory/member lists*
- *hexadecimal editing*
- *50-line VGA*
- *user interface*
- *utilities*
- *network support*



SPF/PC includes many PC-productivity features to save time and keystrokes, such as direct access to BROWSE and EDIT directory lists from the DOS prompt.

Want proof? Ask us for a FREE, interactive demonstration diskette.

SPF/PC — so much like the real thing, you'll forget you're editing on a PC.

CTC

Command Technology Corporation

1040 Marina Village Pkwy, Alameda, CA 94501 (415) 521-5900
Orders: (800) 336-3320 *FAX:* (415) 521-0369 *Telex:* 509330 CTC

We've made channel extension this simple.

MCD

McDATA's LinkMaster® 5200 channel extenders make remote operations simpler and less expensive. The 5000 series offer a direct mainframe channel extension, so there's no need for FEPs or remote hosts. That keeps equipment costs and management time down.

LinkMaster 5200 channel extenders require no proprietary host software, eliminating licensing, maintenance and personnel costs. Fiber optic or T1 capabilities mean you can locate devices wherever convenient for your needs. Data integrity is ensured.

LinkMaster 5200 channel extenders require no proprietary host software.

All McDATA® products – channel extenders, controllers and network processors – are designed with simplicity of operation in mind. For example, the LinkMaster 5200 channel extender can be installed in less than one hour.

McDATA LinkMaster 5200 channel extenders provide reliable, cost-effective and software-independent support for high-performance devices. Call McDATA today at 1-800-545-5773 for complete information and detailed specifications on McDATA channel extension products.

It's that simple.

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DATA

On the front burner

As Mast Industries' vice-president of MIS, Ed Somol constantly strives for new ways to use communications to cut down on turnaround time in the offshore production of garments for Limited, Inc. subsidiaries.

Some of his upcoming plans include the following:

- Using artificial intelligence to create an electronic customs clearance document that would automatically determine the classification of a garment and its duty rate. The goal would be to expedite the import and export of goods at the U.S. Customs Department and the Hong Kong Trade Department.
- Integrating the company's computer-aided design and manufacturing system into the mainframe to speed up the processing of images and make them a part of the corporate database, which is accessible by nearly 1,000 worldwide Limited, Inc. employees.
- Developing a process to run facsimile applications through the company's IBM 3084 mainframe, for which a product is currently absent from the marketplace, according to Somol.
- Upgrading Mast's 3084 to a 3090 Model 300 or 400 in two or three years as business grows.
- Converting two 56K bit/sec. Andover, Mass.-to-Hong Kong satellite links to terrestrial links, a project that is now under way.

JOANIE M. WEXLER

A classic IS approach to fashion

ON SITE

BY JOANIE M. WEXLER
CW STAFF

ANDOVER, Mass. — In an era when downsizing and distributed computing are in vogue, Mast Industries, Inc., an $800 million subsidiary of The Limited, Inc., has found that staying centralized on a straight IBM platform is the best way to meet corporate business objectives.

However, while Mast is taking a traditional approach to sharing computer resources, the company is far from old-fashioned. It committed early on to electronic mail and electronic data interchange and is dabbling in such innovative technologies as high-definition television (HDTV) and computer-aided design and manufacturing to maintain its strategic edge: delaying retail buying decisions to better assess consumer desires.

Mast's business function is to source women's apparel for The Limited, Inc.'s retail subsidiaries, including The Limited, Express, Victoria's Secret, Lerner, Lane Bryant and Abercrombie & Fitch, as well as for three catalog businesses. Retail buyers approach Mast with ideas for garments they would like to see in their stores. Mast, working with independent factories in Hong Kong, Korea, Taiwan, Singapore, Israel, England and Italy, is responsible for getting the clothing produced, according to Edward Somol, Mast's vice-president of management information systems.

The benefit in shortening the production time, Somol said, is that "if we put the right merchandise in the store, we don't have a lot of leftover clothing to sell at a lower price to [a discount reseller such as] Marshall's or Loehmann's, and to achieve our margin objectives, we don't need to inflate our prices."

Somol estimated that once a buyer has approached Mast with a request, the company can have "hundreds of thousands of units" produced in 30 to 60 days. This compares with estimated lead times of 90 to 120 days for competing specialty stores and seven to 10 months for department stores, he said.

The centralized setup is integral to Mast's quick-turnaround operation, which depends on employees worldwide having access to a Computer Associates International, Inc. IDMS database running on an IBM 3084 mainframe in the company's headquarters here. The mainframe supports nearly 1,000 IBM 3192 and 3193 terminals distributed throughout seven retail and three catalog divisions in the U.S. and in offices in the Pacific Rim, the Middle East and Europe.

"Right now, we're doing very little with personal computers, because our data is all validated by the MIS and finance departments, and we would lose that control," Somol explained. "The PC algorithm does not go through the rigorous testing that we do on the mainframe."

With the vast time difference between Mast and the offshore locations, Somol said, the company is always looking for ways to speed up communications. Somol said he does not believe in waiting for the industry to offer him the applications he needs and has often developed them in-house (see story below).

In addition, the company recently tested both videoconferencing and HDTV for conducting global discussions on fabric colors and textures over its AT&T Accunet X.25 packet-switched wide-area network, which hooks into satellite links provided by MCI Communications Corp.

Within the U.S., Mast links corporate offices in Andover, New York, Columbus and Indianapolis via terrestrial T1 lines from AT&T and MCI.

The "35-mm-quality" images produced by HDTV, Somol said, are what make the technology viable for accurate fabric comparisons on either end of the globe. "With HDTV, we can zoom in on a complex print and see enough detail to count the stitches in a garment," he said.

He added that The Limited, Inc. sends about 100 people overseas on buying trips four to five times a year and that while using HDTV to reduce costs is a big plus, "the real reason to do it would be to cut down on turnaround time. In our February HDTV trial, we were able to make a decision in five minutes that previously would've taken us four or five days."

One limitation to HDTV, Somol said, is high transmission costs. "You might invest millions of dollars in capital equipment, but you can amortize that over many years," he explained. "What gets expensive is having to spend an equivalent amount each year in transmission costs."

Offshore headaches

Using offshore factories to manufacture large volumes of garments may be cost-effective in terms of labor, but it can also add complexity in coordinating computer operations. Mast Industries, Inc. Vice-President of MIS Edward Somol cited some roadblocks:

- Inferior telephone service in some areas. Somol said that AT&T's Accunet packet-switched wide-area service "isn't what it should be" because the two 9.6K bit/sec. links he uses run over a network segment — Israel to London — that operates at just 1,200 bit/sec.
- Unavailability of some equipment overseas. Somol pointed out that part of the reason his operations are centralized in the U.S. is that much of his computer and communications equipment of choice is not available in the countries in which his company has offices.
- Discrepancies in regulatory policy among countries. Somol pointed out that in the U.S., there is one set of consistent rules that apply to one large geographical area, but that in other parts of the world, "you may be able to do something in one country that you can't do in a neighboring country." For example, he said, in the U.S. he can put up a satellite dish and broadcast to another dish anywhere in the country. "In many foreign countries, you can't do that — sometimes between countries or even within one country," he said.

JOANIE M. WEXLER

If you want it right, do it yourself

Mast Industries, Inc.'s IS department could be considered ahead of its time, given that it has developed many of its own applications in-house because it has not found them offered commercially. For example, Mast created its own electronic mail system in 1982, which Vice-President of MIS Edward Somol said is the "backbone" of its ability to bridge the time-zone gap between Mast's Andover, Mass., headquarters and its offshore production offices.

"We can make a request of our production offices in the form of a quotation and receive responses in the form of a cost sheet overnight using E-mail," Somol said. "That process would otherwise take several days."

The system also addresses the communications needs of a few offices that are not yet online but are equipped with Telex machines by automatically converting E-mail messages to a Telex format for off-line offices.

Mast also uses an internally developed electronic data interchange (EDI) application that allows freight forwarders to send shipping documents to Mast's corporate database so worldwide employees can track delivery progress from the factories to the retail stores.

"We're also in the process of developing an accounts payable EDI application, which should be in place this summer, that will allow us to move to a paperless billing system," Somol said.

He added that his intent is to expand the EDI system to express mail carriers and factory locations so that Mast can send its order specifications electronically and Mast's partners can in turn send scheduling and billing information.

JOANIE M. WEXLER

Cabletron unwraps simpler LAN protocol analyzer

BY JIM NASH
CW STAFF

Banking on the premise that IS systems departments are being oversold on local-area network protocol analyzers, Cabletron Systems, Inc. has introduced a cheaper, more basic analyzer.

The Rochester, N.H.-based firm has introduced its Lanview analyzer, priced at $11,995, which Cabletron claimed is half the price of competing products. Scott Maclenar, senior technical support engineer at Cabletron, said Lanview runs on Intel Corp. 80286 systems and supports 10 protocols on IBM-compatible PCs operating on Ethernet networks for that price.

"Lanview is quite a bit like a [Network General] Sniffer," said Michael Welts, Cabletron's director of marketing.

For example, Lanview lacks Token-Ring accessibility, but Maclenar said there are plans to introduce a Token-Ring analyzer at an unspecified future date.

While Lanview will single out faulty protocols, it is unable to specifically identify what is wrong with the protocol. The upside is that this omission frees more memory on the card, reducing the card's cost.

Maclenar said the analyzer supports Open Systems Interconnect, Transmission Control Protocol/Internet Protocol, Digital Equipment Corp.'s Decnet, Xerox Network Services, Banyan Systems, Inc.'s Virtual Networking Software, Novell, Inc. Netware, Bridge Spanning Tree and Apple Computer, Inc.'s Appletalk on Ethernet.

Cebit shows hands-on OSI uses

BY DONALD FRAZIER
SPECIAL TO CW

HANNOVER, West Germany — The world's largest and, by all accounts, most ambitious demonstration of Open Systems Interconnect (OSI) products took place at Cebit '90, which linked 29 vendors and nine large user organizations in several complex business applications.

Highlights included the first multivendor demonstration of the X.500 directory standard, the first demonstration of Office Document Architecture documents moving between businesses and the largest demonstration of the File Transfer Access and Management protocol for file interchange.

However, the major attraction of the demonstration to visitors from Europe, the U.S. and Asia was the chance to see how OSI-driven applications could make a business more productive when employed as part of its overall strategy.

"OSI has simply gone farther in Europe than in the U.S.," according to John Moorjani, head of network product marketing at Unisys Corp. in Europe. "Here the emphasis has moved beyond the technical to the practical: How can business use these tools to do what businesses do, that is, make money and save money?"

Growing trend

OSI applications will become an increasingly important part of business in the U.S. as trends in business computing here pick up speed, Moorjani said, and representatives for vendors such as IBM, Wang Laboratories, Inc., Digital Equipment Corp., AT&T and Data General Corp. concurred. One is the growing popularity of enterprisewide applications as an information systems concept; others include the decentralization of computing resources and the growing need for wide-area networks.

Demonstrations featured OSI applications in four business models connecting several industries and companies across Europe.

The manufacturing model, for example, described the daily interchange of vital business information between a manufacturer's home office, its outlying production plants and its bank via X.400 electronic mail links and the Edifact electronic data interchange (EDI) format.

This demonstration and the others took place in real businesses using the actual hardware and applications the businesses use. Such demonstrations in the U.S. have almost always been simulations; the few OSI demonstrations have focused on the technical feasibility of these applications and not on their purpose.

EDI in particular will force its way into the U.S. market soon, according to Anne Fairhurst, a product manager for DG's network products group in West Germany. Companies that can do business with suppliers and customers with Edifact documents will gain ground over competitors who cannot do so because it is cheaper and easier to work with them, she said: "Already we see companies insisting that all suppliers, for example, accept payment electronically in response to a sequence of EDI transfers."

As U.S. companies become global they must also do this, she said.

Acceptance of the X.500 directory standard will dramatically speed up the use of EDI applications under OSI standards, said a representative of Dresdner Bank, which took part in demonstrating the new standard.

One major benefit of X.500 lies in its users' ability to access a remote directory on its own terms. As demonstrated at Cebit in an exhaustive application involving IBM, Siemens AG, Retix and Nixdorf Computer Corp., X.500 allowed a user to reach into a central database from a remote site for data that fulfilled a certain set of requirements without either tapping into a central application or downloading the entire database.

Lurin

FROM PAGE 47

needs the equipment vendors to train Boeing's network technicians and to supply high-quality manuals. He says he feels that the manuals, in general, are good but the vendor training is poor. He also believes that smaller firms will need even more support than he does.

Another network planning manager in a large company, who prefers anonymity, is more blunt. He says it is fortunate that his vendors have good training on network equipment because the manuals are so poor. His purchase strategy is to obtain all of the support manuals of competing vendors before the purchase decision is made. Then he can evaluate their quality. For him, the support quality is a large part of the purchase decision.

The following are two reasonable solutions to the support problem:

- Increase the level of support and assume that the customer is willing to pay for it because of the importance of the network.
- Automate the support by the use of high-quality manuals and self-paced training.

Codex, for example, uses both solutions. It will become the "network program manager" for some customers, providing design and construction of the network and training the telecommunications departments to operate and maintain the network.

Documentation will include standard equipment documentation plus custom documentation for each specific network. Training is provided by live instructors. This is really the approach used by mainframe vendors whose high margins can justify this level of support.

In contrast, the automated support approach, which can become quite sophisticated, is really the personal computer approach. PCs are supported by excellent manuals, local distributor repair capability and self-paced training, including videotapes supplemented with workbooks, computer-based training (CBT) and interactive videodisc.

Gary Slavin, director of marketing for Science Research Associates (SRA), says he believes that self-paced training is quite applicable to network equipment and operations. His firm is targeting the software and network technican for training. He says he feels that SRA and similar companies can take up any slack from the network equipment vendors in training.

It is reasonable that the PC model of network equipment support and the mainframe model of network equipment support will both prevail. However, just as the importance of PCs relative to the mainframe has dramatically increased, the importance of the PC support approach for networks will also increase.

What this means is that users will be more and more able to handle their own needs and will be able to design more of their own networks — maybe not the very largest networks but the average network for midsize companies.

It also means that local third-party vendors and distributors will do a lot of repair. Users can swap their own boards.

Manuals will be good. They will be complete, easy to use and attractive. Users will be hesitant to buy what is hard to use.

High-quality training will be provided by third-party vendors and applications vendors. It will include instructor-led training, CBT, videotape with workbooks and interactive videodisc.

There will be a great deal of general user knowledge about networks.

Of course, some people believe that networks are too complex for all of this to happen. But that is what they said about PC applications. The mainframe exists and will continue to exist — same as the large complex network will. However, there will be major alternatives for the user, especially in the support area.

Lurin is president of Elan, Inc., a consultancy based in Great Neck, N.Y.

Definity

FROM PAGE 47

tually all the systems are on a parity. But finally AT&T is allowing seamless migration between systems, so users can grow without substantial equipment upgrades and swap-outs."

When Starkey came to Bear Stearns three years ago, he inherited a conglomeration of switches, including a Northern Telecom, Inc. SL-1, an IBM Rolm CBX, an AT&T System 75 and a Centrex central office switching service. He said his firm outgrew the processor on the System 75, and Definity's dual processor handles his heavy busy-hour call processing.

"With Rolm, to upgrade would have cost us a quarter of a million dollars, and we would have had similar problems with Northern," he said. "The upgrade [from System 75 to Definity] only cost $30,000."

Schmiedeke noted that AT&T's PBX market share grew from 22% in 1988 to 26% in 1989, which he attributed not only to the introduction of Definity but also to AT&T's capitalizing on a roller coaster of events that led to industry uncertainty about the fate of competitor IBM's Rolm switches, now marketed by The Rolm Co., which is jointly owned by Siemens Information Systems, Inc. and IBM.

Art Krumrey, assistant vice-president for information services at Loyola University-Chicago, chose Definity over Rolm largely because it was more "ISDN-ready." Krumrey links two Chicago campuses to a medical center in Maywood, Ill., with three Generic 2s, which he said have provided him with a uniform five-digit dial plan that spans two area codes.

Krumrey — like Austin and Starkey — is not currently using the switch's Integrated Services Digital Network (ISDN) capabilities but said he wanted an ISDN-capable switch to position him for the future.

Definity and many of its competitors, including Northern Telecom's SL-1 and SL-100, the Rolm 9751, Hitachi America Ltd.'s HCX5000 and Fujitsu Business Communication Systems' F9600, are equipped with ISDN interfaces.

A glitch or two

Even successful new equipment installations are rarely headache-free. The Foxboro Co. in Foxboro, Mass., had to let its remote module of the AT&T Definity private branch exchange (PBX) collect dust for nearly a year because senior systems analyst Anne Austin did not know remote modules must link to the main switch over fiber cable.

Austin explained that in New England, within one local access and transport area, a carrier will not rent "dark" fiber — fiber that does not travel through the central office. "You have to buy and install it," she explained.

Austin said she had a difficult time both in finding someone to install the fiber and in obtaining rights of way from the local utility companies. She finally was able to negotiate with her local cable television company to lay the fiber and lease her its rights of way. The PBX is slated for cutover early this month.

"I was also disappointed that I had to buy a [AT&T] 3B processor to run traffic statistics," Austin said. "That was an extra $50,000 I didn't expect."

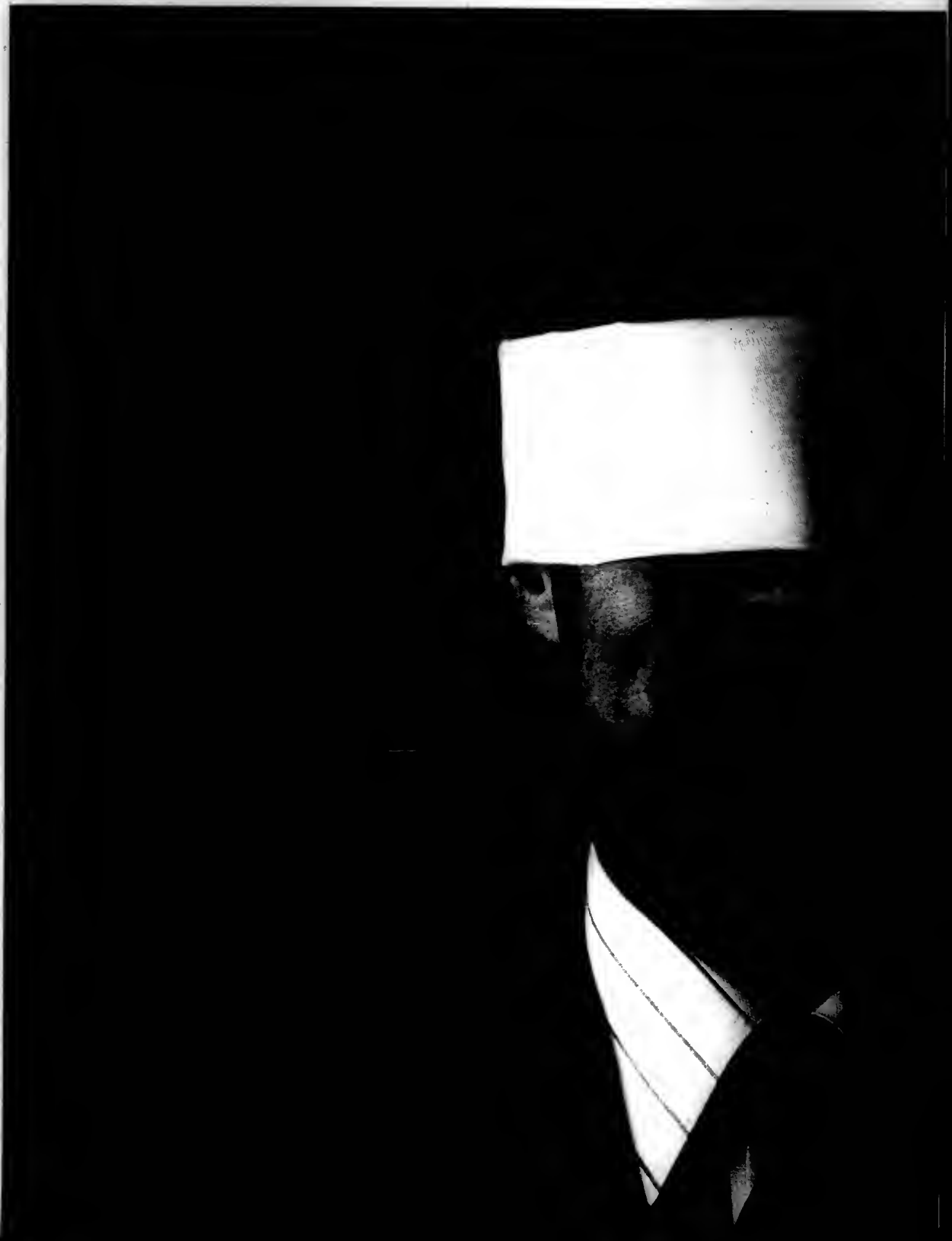
Art Krumrey, assistant vice-president for information services at Loyola University-Chicago, where three Definitys link two Chicago campuses and a medical center, said he is working with AT&T to fine-tune the PBX's software for better network recovery.

"Right now, if a T1 between two campuses is lost, it takes about 10 minutes to reroute calls," he said. "The PBX should be able to immediately reroute calls over the public network."

Ken Starkey, associate director of communications at brokerage firm Bear Stearns & Co. in New York, said he wishes AT&T would soon make Definity more widely available in Europe. AT&T explained that the holdup is in getting approvals for Definity from the various European governments. The company noted that Definity is available in Greece and in about 15 countries in the Far East and Middle East.

JOANIE M. WEXLER

Compared to HP's NewWave Office, IBM's



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To date, sixty companies are writing software for HP NewWave Office. According to IBM's advertising, eight are writing applications for IBM OfficeVision. So, which system gives your people a greater selection of software?

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NEW PRODUCTS

Front ends/ Multiplexers

Memotec Data, Inc. has released a time-division multiplexer (TDM), the Mux 864, as an option to the company's 9600A and 14.4A leased-line Integrated Diagnostic Modems. The multiplexer reportedly supports four, six or eight channels and includes an asynchronous-to-synchronous converter, which accepts asynchronous data of seven to 12 bits.

Elastic buffers for each channel can be used when extension modems communicate with remote terminals, compensating for phase differentiation and phase drift between the multiplexer clock and the modem receiving clock.

The TDM is available for $1,500 as a separate board that can be housed in the modem cabinet or rack mounted.

Memotec Data
600 McCaffery St.
Montreal, Que.
Canada H4T 1N1
514-738-4781

Network services

British Telecom (BT) has announced a multimedia telecommunications network under terms of a tripartite agreement with MCI Communications Corp. and Kokusai Denshin Denwa Co. Ltd. (KDD).

The private, international service will enable customers to access facsimile, messaging, data and voice services integrated on high-speed digital channels. The network's core will be made up of control centers in London, Piscataway, N.J., and Tokyo.

Around-the-clock service will also be provided by the carrier's worldwide network of fiber-optic and satellite transmission facilities.

BT's network is called Primex, a service that offers private, international networks for voice, data, fax and store-and-forward messaging that can be connected to a customer's network. Primex also provides totally integrated management systems tailored to individual customers' needs.

The corresponding service from KDD is referred to as Port-Plan or the Corporate Communications Network Service; MCI's network is referred to as Commax.

British Telecom
100 Park Ave.
New York, N.Y. 10017
212-297-2700

Electronic mail

Gandalf Data, Inc. has introduced a distributed electronic mail system that reportedly allows users to compose, store, send and receive messages or files from their desktop terminal or personal computer.

Gandalf/Mail operates in conjunction with the Starport computing of Gandalf's Starmaster network processor and the Network Courier family of applications software. The system allows all mail activities to take place without terminating the worker's primary PC application, according to the vendor.

The product is available for immediate delivery to Gandalf Starmaster and Starpoint systems customers. It costs $4,000.

Gandalf Data
1020 S. Noel Ave.
Wheeling, Ill. 60090
708-459-9348

Modems

Fujitsu America, Inc.'s Data Communications Division has unveiled a 9.6K bit/sec. network management leased-line modem.

The LN 9.6 features an integrated two-call dial-backup function. It can automatically change to dial lines if leased lines fail and switch back to leased lines when conditions improve, the vendor said.

The unit can be configured, tested and monitored by the FMS 1000, Fujitsu's data communications network management system, or by its own LCD-based front panel. The mode is compatible with CCITT V.29 recommendations and is designed to operate in synchronous or asynchronous modes in point-to-point applications.

A stand-alone version of the product is now being offered at $2,395.

Fujitsu America
3055 Orchard Drive
San Jose, Calif. 95134
408-432-1300

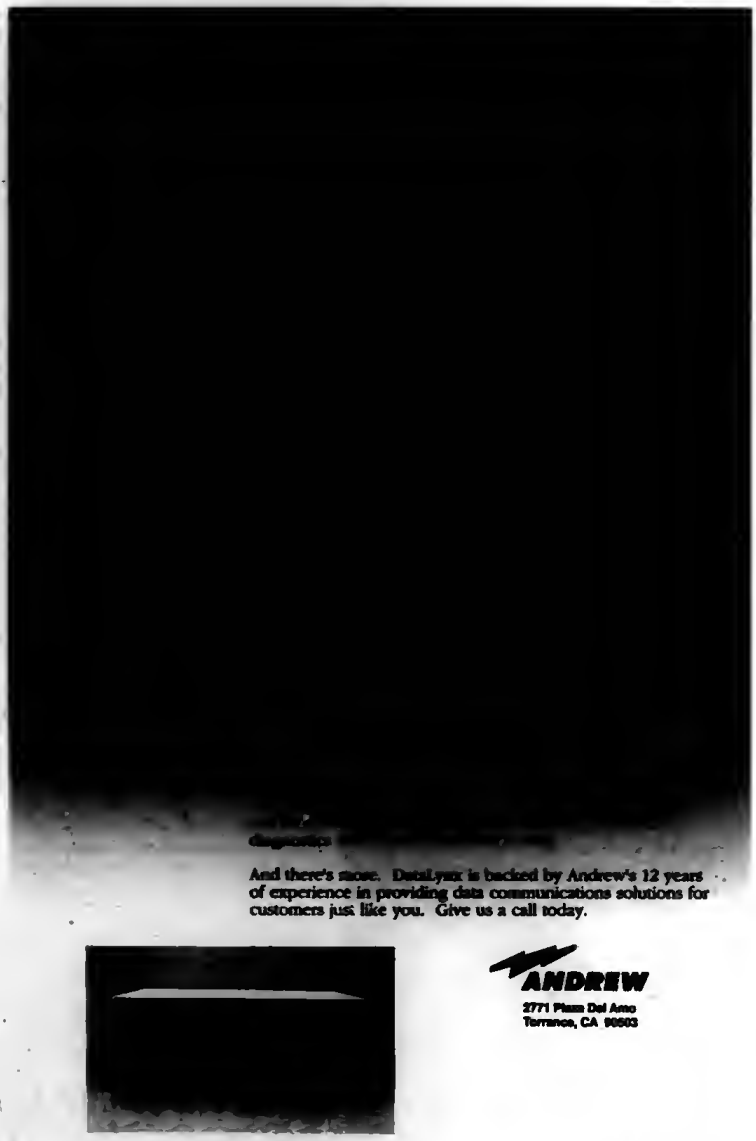
Diagnostic equipment

The C Programmer's Tool Kit from Progressive Computing allows network technicians and field service programmers to write and compile quality-assurance, simulation or diagnostic programs for use by nonprogrammers.

The software enables programs written with off-the-shelf C compilers from Borland International, Lattice Corp. and Microsoft Corp. to be used with Progressive's personal computer-based protocol analyzers. Captured data can be read off-line for playback or analysis, the vendor said.

List price for the software program is $995.

Progressive Computing
Suite 101
814 Commerce Drive
Oak Brook, Ill. 60521
708-574-3399

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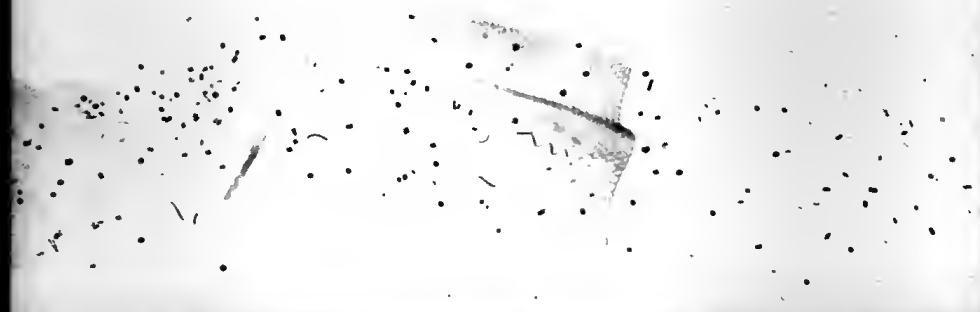

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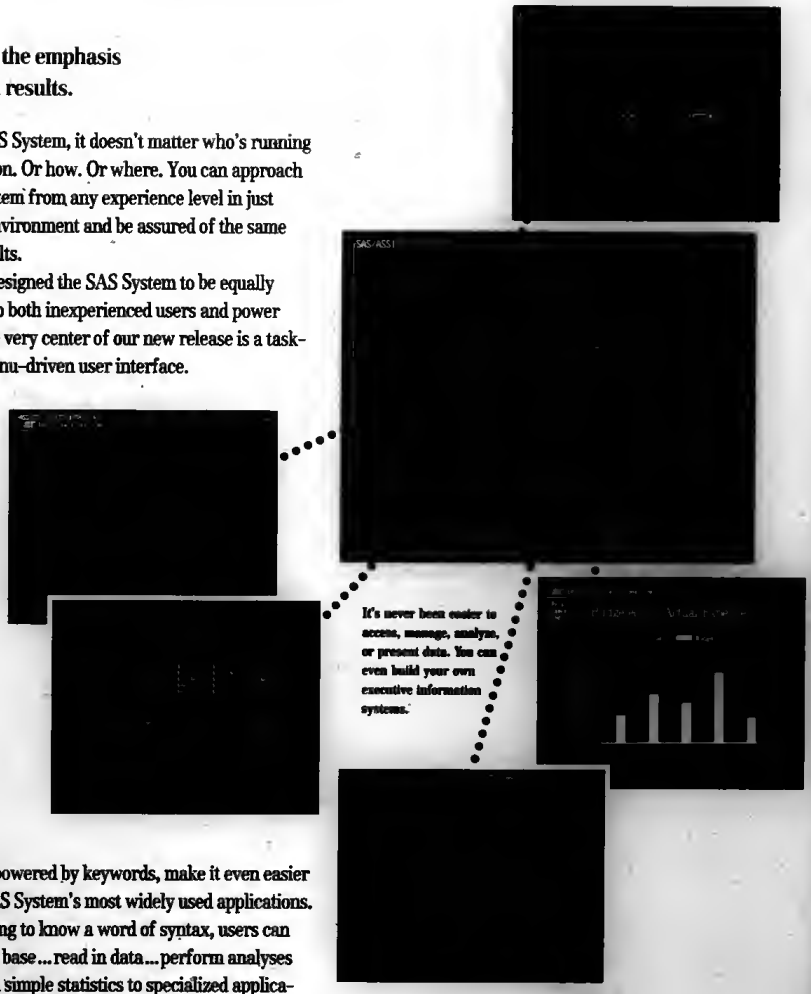

The menus, powered by keywords, make it even easier to run the SAS System's most widely used applications. Without having to know a word of syntax, users can access a data base... read in data... perform analyses ranging from simple statistics to specialized applications such as forecasting, project management, and quality improvement... and generate a variety of reports and graphs.

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There's a command-driven interface especially for systems analysts, applications developers, MIS personnel, and the Information Center staff.

From this interactive windowing environment, you can use the SAS System's English-like commands to build applications in a fraction of the time. And you can customize any application any way you choose by adding user-friendly menus and fill-in-the-blank screens.

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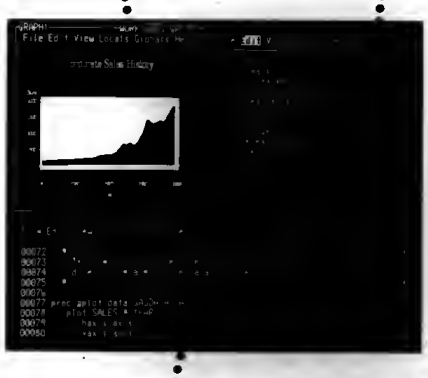

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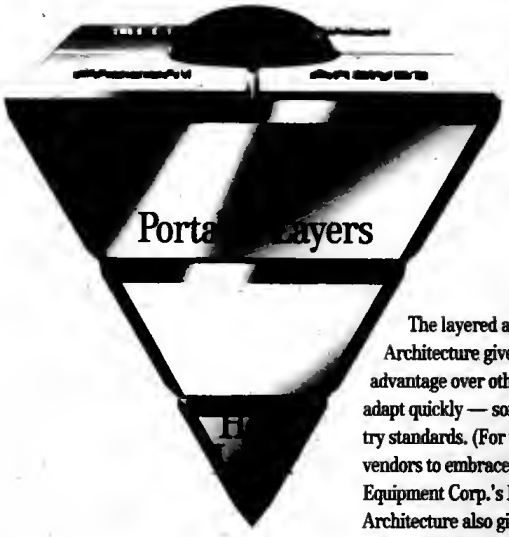

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Data General

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But getting data from place to place is just part of the challenge. Data *management* is also key, and the SAS System responds with efficient ways to enter new data... edit and query data files... and manipulate your data. You can even merge data from totally different kinds of files. And your inexperienced users can enter their data through customized fill-in-the-blank screens that look exactly like your business forms.

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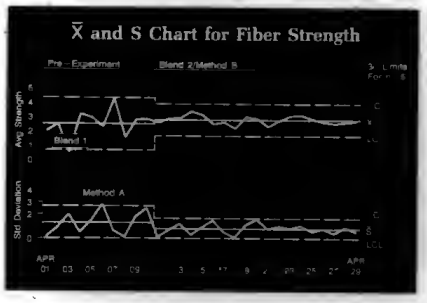

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MANAGER'S JOURNAL

EXECUTIVE TRACK

Gerry W. Garver has been named director of MIS at the **American Legion** national headquarters in Indianapolis.

Garver joins the Legion from G2 Engineering, Inc. in Crawfordsville, Ind., where he had been president since October 1988. Prior to that, he spent five years as a manager of IS at Apple Computer, Inc. in Cupertino, Calif.

Garver holds a bachelor's degree in business from Indiana University. He is a member of the Data Processing Management Association and the Guide, Share and Common users' groups.

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Donald D. Roy was promoted to director of the systems design division for IS development at the **Internal Revenue Service** in Washington, D.C.

Roy was most recently assistant director of the systems support and testing division since 1988. Before that, he was project manager in the office of disaster recovery for two years.

The IRS also named **Renee O. Shaw** director of the systems acquisition division for IS development.

Shaw had been chief of the IRS office of standards and the data administration division since 1987. She joined the IRS in 1986 as chief of the automated data processing standards branch.

Before joining the IRS, Shaw worked in IS positions at Control Data Corp., Sperry Univac Federal Systems, the Department of the Army and the Small Business Administration.

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Who's on the go?

Changing jobs? Promoting an assistant? Your peers want to know who is coming and going, and *Computerworld* wants to help by mentioning any IS job changes in Executive Track. When you have news about staff changes, be sure to drop a note and photo to or have your public relations department write to Clinton Wilder, Senior Editor, Management, *Computerworld*, Box 9171, 375 Cochituate Road, Framingham, Mass. 01701-9171.

Two heads are better than one

Prudential's co-commanders of IS contribute unique perspectives to their purviews

BY ROBERT MORAN
CW STAFF

The Prudential Insurance Company of America has taken an uncommon managerial approach to directing its massive and evolving information systems organization: It divided to conquer.

Two executive vice-presidents are charged with steering Prudential's Roseland, N.J.-based IS as well as its approximately 4,500 employees and $800 million annual budget. The two men bring vastly different backgrounds to their responsibilities, but their combined years of IS experience are approximately equal to the timespan of commercial computing itself.

Fifty-year-old Bill Friel, a 30-year IS veteran, has the task of commanding Prudential's IS infrastructure. Forty-two-year-old Michael Vitale, who sports a strong background in teaching, is responsible for ensuring that business units use information technology appropriately.

"You learn over time that it is really not good for business or for the enterprise for one person to run a larger or more complex operation," Friel says.

Vitale took the academic road to IS. After earning a Ph.D. in mathematics at Dartmouth College and an MBA at Harvard University, he taught math at Skidmore College, then accounting and IS at Harvard Business School. At Prudential, he is the business units' IS facilitator.

"We try to make sure that the people who are making decisions about information technology in the business units are aware of the potential benefits, the potential costs and the risks of the various options presented to them," Vitale says.

Andy Freeberg

Prudential's Friel (left) and Vitale *are in charge of discrete aspects of IS*

The two executives coordinate their roles informally, but each is cautious. "You can very easily put yourself in the position where significant business opportunities are missed because there is nobody looking across the enterprise," Friel says.

Vitale agrees and says that he and Friel share "a moderately irreverent view of the organization and work together very well."

Indeed, that irreverence may be a necessary distancing mechanism for the two to keep above the complex technological underpinnings that empower the nation's largest life insurance provider. With 95,000 employees and $200 billion in assets, Newark, N.J.-based Prudential is spread across the U.S. and has business units in Hong Kong, Belgium, the UK, France, Spain and Italy.

The company currently has four

Continued on page 58

Designing IS for the graying of America

BY MITCH BETTS
CW STAFF

As the demographic "aging of America" becomes apparent in the 1990s, information systems designers will need to make adjustments in the user interface so that computers will be easier for older workers to use.

But exactly what adjustments are needed are not yet clear, according to a report by the National Research Council's Committee on Human Factors. Very little is known about how changes in the visual and mental capabilities of older people affect such tasks as working at a computer terminal.

This would be a fruitful area of research, the report said, given the high growth rate of the elderly segment of the population and the fact that many older people are employed in management, technical and clerical jobs in the service sector, where office technologies are prevalent.

For example, because the lens of the eye loses flexibility with age, the use of antiglare computer screens may be beneficial for older workers. The report said that other human factors warranting research include the lighting around computer workstations, screen contrast and character size, shape and color.

Highlighting text cues helps

Several researchers have reported that certain kinds of text-editing programs are much harder for the older worker to learn. For instance, spatial memory tends to deteriorate with age, causing difficulty in keeping one's place when looking back and forth between the VDT and a document. The researchers found that highlighting "text cues" on the screen aided the performance of older people.

Another area for research is the little-understood phenomenon that older people simply perform tasks at a slower pace.

"Since computers have the capability of controlling the rate of information flow, they allow tasks that were traditionally unpaced to become machine-paced," making tasks such as data entry more difficult for older workers, the report warned.

Perhaps the pacing of automated work should be flexible enough to accommodate older workers, the committee suggested.

Computers could be a valuable tool for older people — as a memory aid, information source and means of communication — if they are designed to be used by young and old alike. The report recommended that a handbook on human factors and aging be developed for use by product designers and computer scientists.

Be wary of 'strategic partnerships'

Outsourcing agreements may wind up in court when business goes bad

BY ALAN J. RYAN
CW STAFF

Vendors who sell outsourcing services are skilled at tossing around phrases such as "don't think of us as vendor and client, think of us as strategic partners."

But user companies jumping on the outsourcing bandwagon should keep their contracts handy at all times, experts said.

The outsourcing contract should be a "tight, legal document," according to David McDowell, vice-president of IBM and president of its National Service Division in Franklin Lakes, N.J. He said users that sign such contracts should be able to lock them away in a drawer. "If you ever have to look at it again, something has gone wrong with the relationship," he said.

That just isn't so, said Frank McDonough, who as deputy commissioner of Federal Information Resource Management at the U.S. General Services Administration (GSA) has seen many outsourcing contracts.

"We live in a litigious environment," McDonough said. If a service provider finds the contract is not really paying off, the provider might try to get out of it. "When companies do business and don't end up doing very well, they often wind up in court."

Bernard Abeshouse, who tracks all contract protests for the Chief Acquisition Evaluation and Analysis Branch of the GSA, said litigation over data processing contracts is constant at the GSA. He said there were 4.1 protests per 1,000 procurements for the last fiscal year.

McDonough also said litigation might begin before an outsource provider can start the required work. "Some companies fight to the death if they lose a bid," he said. When the government began awarding large contracts to systems integrators, McDonough said, litigation created many obstacles to getting the actual work accomplished.

American Standard's Biddle

During the last five years the government has put 40,000 computing contracts up for bid, and half of them were won by private sector sources, McDonough said. With that in mind, he told participants at a recent Yankee Group conference on outsourcing in New York that the opportunity to lock contracts away and never think about them again is rare.

Henry Pfendt, director of information technology services at Eastman Kodak Co. in Rochester, N.Y., is much more upbeat about outsourcing. He said he has confidence in his company's decision to hire facilities managers — IBM, Digital Equipment Corp. and Businessland, Inc. — to handle its facilities management needs. "We think of our strategic alliances as partnerships," Pfendt said.

American Standard, Inc. in Piscataway, N.J., moved to outsource providers by establishing partnerships too, according to Gary Biddle, corporate vice-president of information systems and technology. He said American Standard has been able to retain control of the process through performance guarantees and an information technology management committee that oversees the program.

McDonough maintains that hiring outsource providers is not the same as creating a strategic partnership.

'Smart service' has untapped potential

BY AMY CORTESE
CW STAFF

In today's increasingly competitive business environment, many firms are overlooking a basic function that could potentially be turned into a strategic weapon: customer service.

According to research done by Booz, Allen & Hamilton, Inc., less than 50% of the Fortune 100 service firms are strategically using customer service. Yet in a study conducted by the Forum Corp., poor service was the single largest reason for customers to switch to the competition, well in front of factors such as quality and cost.

While many service leaders practice "high-touch" service with face-to-face communication, few are using information currently scattered around the organization, said Frank Petro, a vice-president at Booz Allen's San Francisco office.

However, the traditional "high-touch" customer service and the more recent phenomenon of customer information databases are merging to create a new level of service that Boos Allen terms "smart service." This approach combines technology and old-fashioned service with a smile to provide customized, cost-effective service.

To illustrate, Petro cited Citibank's television commercial in which a representative, noticing unusually heavy account activity, calls a Citibank credit-card holder to make sure the card was not being used without her knowledge.

Petro contended that companies can use technology to improve customer service, differentiate products, create competitive barriers and ultimately generate increased revenue. For example, American Express Co. differentiates its credit cards by offering additional services and privileges for its gold and platinum cards at an additional fee.

Financial pioneers

Indeed, the financial services industry has pioneered many advances in customer service, among them the automated teller machine, Merrill Lynch & Co.'s Cash Management Account and most recently, 24-hour "teleservice."

High-tech vendors, ironically, have lagged in using technology to improve customer service, Petro said. "IBM stands out as a leader, but basically it is a high-touch company." Many personal computer makers provide toll-free Help lines but do not go much beyond that, he said.

With technology such as voice, data and image available today, the issue is not technology but how to integrate it, Petro said. In many organizations, customer service functions have become embedded within different functional units, often resulting in many points of contact to solve a customer's problem.

Such was the case at one Booz Allen client, an anonymous financial services firm with $20 billion in assets. After a 16-month project integrated information bankwide and made it available on representatives' workstations, the average number of calls handled increased from 40 to 90.

Moving to smart service requires large financial investments and top management commitment, and it often involves restructuring the organization, Petro cautioned. However, once the infrastructure is put in place and the company can market its superior service, the investment will build on itself in brand loyalty and new revenue streams, he said.

TAKING CHARGE

Alan J. Ryan

Take a look in the mirror

As a manager, you spend a lot of time thinking about your employees — how well they fit into the corporation, their role in your department, their work habits and how you can help them to improve.

But take a moment now and ask yourself, "What do they think of me?" The possibilities are endless. Here are some manager types to get you started:

The Brusque: I am harried, overworked and do not have time to chat — whether it is related to work or not. *(Smile at me but don't talk, and I'll probably promote you.)*

The Over-Jovial: I am happy, happy, happy and willing to overlook nearly every problem that comes my way. *(You don't want to be considered too close to me when I get my walking papers from above!)*

The Pass-the-Buck: "Ask so-and-so, and if she can't help you, ask her who can," is my favorite line. *(I'll also find a way to blame YOU if anything goes wrong.)*

The Famous: I spend 90% of my time speaking at conferences and telling my competitors how I'm beating the pants off them. *(So what if I haven't been to my office in three weeks? The chief executive officer loves me.)*

The MBA: I am using information systems as a stepping-stone on my way to the CEO's office. *(Don't bother me with technical mumbo-jumbo because I just don't understand it.)*

The Technoid: I speak Cobol. *(English is my second language.)*

The I-Don't-Delegate: Why, sure I know how to dole out the work that needs to be done. But why bother when I can do it all myself? *(I may grumble out loud about my work load, but at least I'm sure it's done right.)*

The Counterfeiter: Money burns a hole in my pocket. For every 386 turbo personal computer that comes in the door, I want to see an old 286 chucked into the dumpster out back. *(Some say I print money in the back room.)*

The Nearly There: I'm just biding my time. I'm going into semi-retirement at age 35. *(And when I'm not on the golf course, I'll be right back here in my old office on a consultancy basis, raking in $500 per hour.)*

The Yesser: The "n" word isn't in my vocabulary. I'll take on anything. *(And if it doesn't work, I become the* Pass-the-Buck *type.)*

The Excuse: Got an idea? I'll tell you it is too expensive, we don't have the manpower or processing power or that your idea just stinks. *(If it ain't broke, why fix it?)*

The Homer: My spouse was a nag this morning, my kids were screaming, and I'm not happy about it. *(Stay away from me — I've got a guillotine in my pocket and I'll be more than happy to lop off your head.)*

> TAKE A MOMENT now and ask yourself, "What do they think of me?"

The Your-Business-is-Yours: I don't want to hear about your sick kid, your flat tire or your appendicitis. If I could put you all on the time clock, I would. *(Even my kids call me Ebenezer.)*

The Squeaker: I plan to single-handedly take our company out of debt. The workers I don't lay off will take a cut in pay, work longer hours and forfeit vacation time. *(After all, we're in this together.)*

The Military Operator: You're my people. In some ways, I feel I own you. But whether or not I always agree with you, I'll defend you to any other department. We handle our problems ourselves. *(The rumors that I spent too many days in the hot sun on Parris Island are not — I repeat NOT — true.)*

The Glacier: I was here when they served Woolly Mammoth in the cafeteria. I know all about vacuum tubes and I think I'm starting to get used to that Osborne portable computer I have at home. *(And have I mentioned I've got a GREAT VISION for what our users really need???)*

Ryan is a *Computerworld* senior writer.

BOOK REVIEW

Change: The prize of a well-run adhocracy race

ADHOCRACY: THE POWER TO CHANGE
By Robert H. Waterman Jr.
Whittle Direct Books, $11.95

If you believe Marshall McLuhan's famous statement that the medium is the message, then Robert H. Waterman's *Adhocracy: The Power to Change* is a true book for the 1990s in more ways than one.

This concise 86-page volume is a well-written but predictable paean to the virtues of "adhocracy," or flexible, cross-functional corporate teams that slash through bureaucratic red tape to produce business successes such as the Ford Motor Co. Taurus. Among new-wave management theories, the premise is no more original than praising motherhood and apple pie, but Waterman does offer many useful do'a and don'ts on successfully implementing adhocracy. The book is chock-full of real business examples, something that quickie management-advice works such as this one often lack.

What is truly original — and rather troubling at the same time — is the actual medium. A book is a book, right? However, when you turn to page 1 of *Adhocracy*, you will wonder. The facing page, and a dozen others throughout the book, contain not Waterman's words but colorful pictures with advertising copy singing the praises of Federal Express Co.

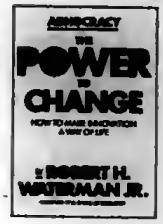
What next?

That's right, full-page ads in a book. Whittle Communications previously blazed new trails in advertising with informational posters in doctors' waiting rooms and with Channel One, the controversial in-school TV channel. Now Whittle has launched The Larger Agenda Series, of which *Adhocracy* is the second entry. Each book covers a management or public policy topic (the first was *The Trouble With Money* by supply-side critic William Greider), and each is exclusively "sponsored" by Federal Express.

Adhocracy begins with a disclaimer by Whittle Editor in Chief William Rukeyser noting that the opinions in the book belong to Waterman, "not the publisher or the advertiser." Granted, Federal Express is not even mentioned in the narrative, but I still find it bothersome.

Call me a purist, but I don't like to see the experience of reading a book made to feel like watching television. I can deal with advertising on shopping carts or baseball stadium scoreboards between innings. I also realize that this is the '90s and that one company has even patented a device to place recorded ads in the four-second intervals between rings of an unanswered telephone [CW, Dec. 28, 1989-Jan. 1, 1990]. And I certainly have nothing against Federal Express, one of the most effective users of information technology in the world. However, can't we draw the line somewhere?

If you can put up with the interruptions, however, there are plenty of useful nuggets in *Adhocracy*. Waterman's most important message is that the sort of quick-reacting, innovative ad hoc teams that create business breakthroughs do not happen by accident. It's not a question of freewheeling "intrapreneurs" vs. stifling, managed bureaucracy. Adhocracy must be managed very carefully in order to succeed. And Waterman, the former McKinsey & Co. consultant who co-authored *In Search of Excellence* and wrote *The Renewal Factor*, offers solid advice on how to manage the process.



Whatever form adhocracy takes — a task force, a project team — the keys to success are a supportive corporate culture, strong sponsorship from top management and placing responsibility for implementation in the team members' hands. Throughout the book, he cites unsuccessful examples of adhocracy as well as those that worked. Nothing dooms adhocracy more than "the handoff syndrome": The ad hoc team has worked hard to come up with innovative ideas, but the task of implementing them gets handed off to someone else. "The goal of a well-run adhocracy is not a good report," Waterman writes. "It's change."

Another important point is that the ad hoc team must be the full-time focus of its members, not something to be done on the side. The corporate culture must be one that encourages such participation with the proper incentive and reward systems.

There isn't much here about information systems directly, but there is plenty about business change — something that every IS executive should become an expert on. *Adhocracy* is easy, quick reading, and adhocracy is a worthy trend for business to follow. I just hope that "book sponsorship" does not turn into a trend for publishers and advertisers.

Adhocracy is in limited distribution, available only at Waldenbooks stores or by writing to Whittle Communications in Knoxville, Tenn.

CLINTON WILDER

Wilder is *Computerworld*'s senior editor, management.

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Prudential

CONTINUED FROM PAGE 55

large data centers for testing and production, although Prudential-Bache Securities, Inc. in New York has its own production and development center. In addition, smaller sites throughout the country test applications and, like the rest of Prudential, reside on the corporate network.

Built around IBM's Systems Network Architecture (SNA), Prudential houses big iron from IBM and its compatible vendors and uses about 25,000 Personal Computers and 70,000 terminals. The organization also supports IBM Application System/400s and Digital Equipment Corp. VAX computers and has a 27,000-user IBM Professional Office System network. The company's Newark headquarters sports a 600-user local-area network, with smaller configurations in many other locations.

"We are primarily a fully networked large IBM mainframe organization," Friel says. "Any terminal can access any application anywhere in the network, whether in this country or elsewhere." It is the sort of equipment with which Friel has a lot of familiarity, having spent 23 years at J. C. Penney Co., where his posts included vice-president and director of all systems and data processing activities. Before moving to Prudential in August 1988, he served as vice-president of corporate technology at Automatic Data Processing, Inc. for about one year.

Prudential has established a network management facility — a combination of IBM's Netview and an interface for non-SNA, Netmaster/Sysmaster from Cincom Systems, Inc. With the combined facility, personnel in Roseland can view Prudential's entire voice and data network — down to a circuit or a fan on a private branch exchange.

According to Friel, IS has completed 20 of 80 separate projects oriented toward remote management of IS. Those projects include implanting expert systems modules to manage the network and the data centers. In addition, through the use of technology such as Storage Technology Corp. automated tape libraries, the company wants to minimize manual intervention. Although lower costs are a part of the objective, the real reason, Friel says, is higher quality.

Whether Prudential consolidates further hinges on two factors: economics and service. "The key driving factors toward providing a centralized infrastructure are reduced communications costs and achieving higher quality communications," Friel says. Through the use of AT&T's Tariff 12, for example, the company saves an estimated $20 million annually.

Nevertheless, the company does not envision a glass-house, centralized IS infrastructure. Indeed, distributed systems, managed by IS, are in the offing as enabling software becomes available. The company houses IBM AS/400s in development areas that are viewed as a platform for distributed applications in the future.

"One of our key responsibilities is to set an architecture, if you will, [as a] series of road maps for the business units that recognize the direction we see the enterprise moving in," Friel says.

Enter Vitale, who spent about four years as a consultant with Prudential before coming on board in July 1988. Ironically, in February Vitale ceased to report to the man who hired him — Malcolm MacKinnon, former head of the Information Systems Office, who now heads a group of 1,200 applications developers as senior vice-president of individual insurance and systems administration. The former Information Systems Office is now called the Prudential Financial Services Co. and is headquartered in Roseland.

> WHETHER PRUDENTIAL consolidates further hinges on two factors: economics and service.

Vitale has two principal tasks: to lead an internal consulting organization called Technology Assessment and to direct the company's Technology Transfer Center, which consists of a nine-member team dedicated to exploring emerging technologies such as imaging and expert systems.

So far, the Technology Transfer Center has completed six full-scale consulting reports recommending technology changes in the business units. Some business units have only partially acted on the recommendation, Vitale says, while "others have taken the recommendations further than we would have dared to recommend."

Vitale and his group have encouraged several pilot imaging projects in the business units. One unit is working with Wang Laboratories, Inc. on an imaging project to store and retrieve documents concerning pension funds in the management business.

Vitale also heads an applications development team that advises developers in the business units. Applications development throughout Prudential is still relegated to the IBM 3270 terminal world, with relatively little use of computer-aided software engineering (CASE) technology or workstation support.

The company's move toward CASE has been slowed partly because of a 1960s language called Prucobol, a home-grown language in which Prudential wrote many early applications. However, with the help of in-house-built conversion software and a recoder package from Language Technology, Inc., Vitale says that the company anticipates converting all applications to Cobol 11 by 1995.

"I think that we do a really good job with the new applications — but there is just a load of maintenance" on the old ones, Vitale says. Budgets for applications maintenance vary considerably for the business units, but some dedicate more than 80% of their budgets to maintenance.

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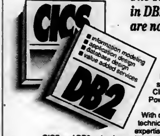

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CALENDAR

Understanding the role of data and information resource management will be one of the topics covered at the Data Administration Management Association's 2nd International Conference slated for next month in Gaithersburg, Md.

Other key topics include selecting a data management tool strategy, developing decision support systems, management issues for the 1990s and using data resource management effectively.

The conference, to be held at the National Institute of Standards and Technology May 7-8, will feature keynote speakers Prof. N. Venkatraman of MIT's Sloan School of Management, who will discuss "Information Technology and Business Transformation," and Robert Curtice of Arthur D. Little, Inc. on "Institutionalizing Data Architecture."

For more information, contact a local chapter of the DAMA or call Debbie Detrick at (703) 841-6374.

APRIL 22-28

Academic Microcomputing Conference. Columbus, Ohio, April 22-25 — Contact: John Schar, Ohio State University, Columbus, Ohio (614) 292-4843.

Software Maintenance Association Meeting and Conference. Vancouver, B.C. Canada, April 22-25 — Contact: Marimac Corp., Tucson, Ariz. (602) 722-3955.

Decision Support and Executive Information Systems: A Managerial Perspective. Cambridge, Mass., April 23-24 — Contact: Decision Support Technology, Cambridge, Mass. (617) 354-6400.

Fiber Optics to the Year 2000. Monterey, Calif., April 23-25 — Contact: Electronic Cast Corp., San Mateo, Calif. (415) 572-1800.

International Technical Project Management Conference. Boston, April 23-25 — Contact: William A. Hurwitz, Center for Project Management, Tyngsboro, Mass. (508) 649-9731.

Frontiers in Project Management Conference. Tyngsboro, Mass., April 23-25 — Contact: Boston University Corporate Education Center, Tyngsboro, Mass. (508) 649-9731.

Automated Mapping/Facilities Management Conference. Baltimore, April 23-26 — Contact: AM/FM International Base Services, Englewood, Calif. (303) 779-8320.

IEEE Seminar on International Telecommunications. New York, April 24 — Contact: Bert Lindberg, IEEE, New York, N.Y. (212) 825-1527.

The Creative Role of MIS in Downsalification. Minneapolis, April 24-25 — Contact: MIS/CIM, Minneapolis, Minn. (612) 851-1515.

Conference for Users of Information Systems. Orlando, Fla., April 24-26 — Contact: Quality Assurance Institute, Orlando, Fla. (407) 363-1111.

Speech Tech '90. New York, April 24-26 — Contact: Media Dimensions, Inc., New York, N.Y. (212) 533-7481.

National Conference on Systems Integration. Washington, D.C., April 24-27 — Contact: U.S. Professional Development Institute, Silver Spring, Md. (301) 445-4400.

On-Line SQL Workshop. New York, April 25 — Contact: DB2 and SQL/DS Users Bulletin, New York, N.Y. (212) 866-7563.

International Conference on Information Systems Quality Assurance. Orlando, Fla., April 25-27 — Contact: Quality Assurance Institute, Orlando, Fla. (407) 363-1111.

Introduction to Telecommunications Principles. Washington, D.C., April 26-27 — Contact: Phillips Publishing, Potomac, Md. (800) 722-9120.

Great Lakes Systems Seminar. Toledo, Ohio, April 27 — Contact: Debra Lipowski, Ernst & Young, Detroit, Mich. (313) 259-8362.

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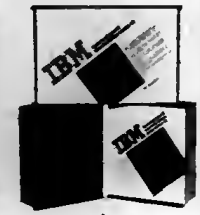

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SYSTEMS CENTER

Voice/data combos: Service with a dial

BY PAUL GILLIN
CW STAFF

When John Stossel wants to check the value of his stock portfolio, he doesn't pick up the paper; he reaches for the phone.

Stossel can also buy and sell stock and check his account balance by calling a toll-free number and pushing a few buttons on his telephone keypad. He never speaks to a broker.

"It's simple to use, and it's private," says the Apple Computer, Inc. software engineer. "I can call from my desk at work and buy and sell stock, and nobody else knows what I'm doing. I always know how the conversation's going to go."

Stossel's "broker" is actually a Charles Schwab & Co. service called Telebroker. Schwab customers in six metropolitan regions can now check stock prices and buy and sell securities by phone at any time of the day or night.

"We're taking over 3% of the firm's trades [this way] already, and we believe eventually we can offload as much as 20% of the routine branch transactions" to voice response systems, says Elizabeth Wilcox, senior product manager of the Telebroker program at Schwab.

Schwab is only one of the many businesses that are moving in computerized voice response systems and moving out telephone operator consoles. The systems effectively turn a telephone into a computer terminal, allowing callers to execute financial transactions, place orders, register for classes and retrieve information by punching the 12 buttons on the telephone keypad.

The systems can also lend a hand in areas like market research and product planning by tracking which services and information are most frequently requested.

With most voice response systems moving onto personal computers, declining storage costs making digitized voice more affordable and use of portable telephones spreading rapidly, the technology is fast becoming practical for most businesses whose bread and butter is getting information to their customers.

Robert de Michiell

PC-based systems that support four telephone lines can be had for as little as $15,000, while high-end systems handling 48 simultaneous calls go for about $50,000.

Port of calls

Customers of Seattle-based Stevedoring Services of America can call a number at any of three West Coast ports and get up-to-the-minute information on the status of overseas goods coming into port. Timeliness is

Continued on page 74

Ford parts division has a better idea

Auto maker's re-engineering effort cuts delivery times, slashes inventory and saves big bucks

INTEGRATING THE ORGANIZATION

Ford Motor

BY JOSEPH MAGLITTA
CW STAFF

When cars are broken or need maintenance, people want them back fast — with no excuses. Just ask Dana Whaley, parts manager of a San Francisco-area Ford Motor Co. dealership.

"The day after the earthquake last October," Whaley recalls, "people shook themselves off, said, 'I'm still here' and came looking for the cars they had dropped off the day before."

To meet rising service demands and keep dealers and customers happy, Detroit automakers are showing keen interest in improving their spare parts distribution systems.

One of the most dramatic projects is an eight-year effort by Ford to radically change how it delivers repair parts to its 9,000 dealers and parts distributors in the U.S.

Begun in 1983 and now nearing completion, the Ford re-engineering project uses decentralized IBM 4381s and an innovative "carousel" warehousing system that handles two to three million transactions per day. The main objective is to speed up delivery of the millions of parts shipped annually by the $3 billion division and to improve order accuracy.

Although the project won't be finished until mid-1991, Ford says the benefits have already been dramatic.

"We're already operating at our projected 1995 capacity," says Pete McIntosh, supply and distribution manager at Ford's Parts and Service Division in Dearborn, Mich.

So far, the new approach has helped eliminate 1.5 million square feet of costly parts inventory, lower shipping times for priority orders from 72 to 48 hours, close 10 regional parts distribution centers and boost shipments in certain large warehouses by 45%, according to McIntosh.

Peter Yates

Ford's Turecki (left) and Havala *guided joint IS and business team*

Ford parts distribution centers in Atlanta, Chicago, San Francisco, Kansas City, Kan., Dallas, New York, Los Angeles and Detroit can now operate nearly around the clock with far fewer errors, almost no paper and greatly improved material flow and tracking, McIntosh adds.

The new approach also gives Ford executives much better control of daily operations than batch systems running on decade-old Burroughs mainframes, says Mick Havala, manager of the parts operations systems department.

"We could never view on the computer what [warehouses] were doing," Havala explains. "Now we can view anything, anytime, for 22 of the 24 hours in the day."

While Ford won't reveal the exact figures, it says the system has already saved "substantial millions."

Ford dealers seem pleased with the new system.

"It's the greatest thing they ever did," says Joe Heery, parts manager for Universal Ford, Inc. in Long Island City, N.Y. While the system can't unclog busy New York City traffic, he says, it has drastically cut down the number of orders that arrive with wrong or missing parts.

Continued on page 66

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April 11	Anaheim, CA	Marriott Anaheim
April 12	Burlingame, CA	Sheraton S.F. Airport Hotel
April 25	Minneapolis, MN	Vista Marquette
April 26	Southfield, MI	Radisson Plaza Hotel
April 27	Schaumburg, IL	Hyatt Regency Woodfield
May 1	New York, NY	Vista Hotel
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Playing integration politics

Technical hurdles are child's play compared with internal struggles, turf battles and user willies

INTEGRATING THE ORGANIZATION

BY ALAN J. RYAN
CW STAFF

Soft-soled shoes and kid gloves may become standard attire in the 1990s for organizations carrying out integration projects. After all, when toes must be stepped on and egos crushed, it should be done as gently as possible.

Experienced information systems managers and consultants say that technology is often the least difficult aspect of integration projects. Managing politics and user fears can be a bigger challenge, they say.

People problems are likely "whenever you start to move toward common and shared data," says Dudley Cooke, president of The Executive Insight Group in Bryn Mawr, Pa. "If the people in the division have the attitude that 'this is my data; I own it,' you'll have a war from the start."

When a company decides to share information — whether across business units or interdepartmentally — business managers and other information "owners" often feel backed into a corner. Some may even react by trying to sabotage the project.

What's IS to do? Experts say that building strong working relationships before any changes take place is key. So is a willingness to provide detailed information on the integration process. Both approaches can help stanch the inevitable fears and internal politics that arise as businesses are transformed and workers change the way they go about their jobs.

And problems *do* arise. Just ask Larry Potter, director of IS at American Industries, Inc., a steel service center company in Portland, Ore. He's seen the best laid plans of management and IS put into slow motion.

When Potter joined the company's American Steel subsidiary, the firm had plans to redesign its business systems so that information could be shared across independent business units. Potter's department was called in to help, and users were suspicious, he says.

"They were afraid DP would come in and say, 'This is how you will have to run your businesses,' " Potter says. The five profit centers that make up American Steel feared changes they thought might hurt their bottom line.

Randy Lyhus

An old tale

Potter's story is not unusual. Kathleen Lennon, director of corporate systems at fuel conglomerate Coastal Corp. in Houston, says integration always involves political problems.

However, she believes the primary role of IS is not problem solving but acting as a discussion facilitator: "The data belongs to the individual organization, and we need to work that out. It is not our data."

In the worst cases, IS executives say, politics can indefinitely delay or scuttle an integration project.

At one Massachusetts-based life insurance company, for example, the biggest barrier to integration is the remnants of a former chief executive officer's philosophy of product line autonomy.

Today, a new CEO is pushing for greater information sharing, but the IS vice-president there, who requested anonymity, says the transition has been slow and difficult. "There is a lot of parochialism, with people saying, 'This is my division data, my client base, and I don't want anyone else fooling around with it,' " he says.

Unfortunately, the roots of many of the political problems surrounding integration can be traced back to how organizations automated various functions.

In many companies, the passing of strict centralized computing induced individual departments and functions to computerize independently. But smoothing out the resulting technological patchwork can be very difficult, says Mike Natan, senior vice-president of Philadelphia-based Cigna Systems, the information subsidiary of insurance giant Cigna Corp.

Continued on page 78

Ryan is a *Computerworld* senior writer.

What's good for the customer . . .

While setting up an information system to better integrate its customers (see story page 71), Transco Energy Corp. took its own example and decided to work on integrating itself.

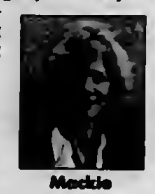
The project's goal was to enable 5,000 interdepartmental programs to work in concert, says Susan C. Mackie, vice-president of information services and chief information officer at the Houston-based natural gas transporter. The internal integration has "transformed" the organization, she says.

For example, certain accounts familiar with how the various businesses ran were shifted into those businesses to help run them.

Mackie says the going was not always easy, however. "People working in the pipeline industry are very, very busy and have more to do than they can do," she explains. "To try to come in and implement a lot of new systems that change the way they are comfortable doing business is really not a great idea from their perspective."

It was here that top-level executive support for the integration project really paid off, she says. "When they saw that their boss' boss was on a committee that was supporting this from a very high level, it helped to move it," she explained.

Inja Chun, manager of gas information systems at Transco, says the company set up three levels of task forces to bring about the integration. The top group was the executive task force and consisted of senior vice-presidents, controllers, Mackie and others. This group had the final say on policy decisions and in resolving other problems during the integration.



Mackie

The second level was the director level. This helped handle problems at the third level, a business systems planning implementation task force chaired by Chun.

The latter group — the heart of the effort — was made up of supervisory- or management-level people from each department, mandated to see that the integration happened.

Attention to detail was key. For instance, Chun says, the accounting department's electronic files on New York, a city it does business with, were labeled "City of New York," while the Gas Control Department labeled the customer "New York City." To be consistent, they had to agree on one term.

Chun says the going was tough for a while: "At first it was hard, but as we went along we formed a type of camaraderie because we knew what we were doing had to be reported to the executive committee and directive committee. Peer pressure and knowing their bosses are really interested and are looking at what is going on helps everybody."

ALAN J. RYAN

Ford

CONTINUED FROM PAGE 63

Ironically, the biggest and most successful cross-functional project in the division's history began as separate efforts by the IS and distribution departments. In 1983, the division's IS group was looking for ways to improve its poor user reviews, says Havala, a 30-year Ford veteran.

Rating boosting

"We got bad notices and bad ratings from our [internal] users because we were not responding the way they liked," he recalls. "We'd get requests to re-engineer systems and couldn't do it well, so we would be a little standoffish. As the business changed, we couldn't change with it."

IS conducted in-depth interviews with users in sales, marketing, finance and other departments and discovered that most complaints could be traced back to central order processing.

Around the same time, the division's industrial engineers were looking for ways to improve parts distribution. The existing process, although computerized, was slow, used a lot of paper and was prone to error, McIntosh says.

Ford's mission

- **Organization:** Ford Parts and Service Division.
- **Goal:** Improve speed and accuracy of nationwide parts distribution.
- **Strategy:** Re-engineer warehousing processes and systems.
- **Payoff:** 45% increase in shipping volume; 1.5 million sq-ft inventory reduction; 600 jobs eliminated; turnaround on rush orders cut from 72 to 48 hours.

"A parts picker would go down the aisle with a big cart and large cartons for six or seven or eight customers," McIntosh explains. "The individual may have got the right part but put it in the wrong carton. We always heard about it when we were short, because the customer got a bill for it. But we never heard about when we were long."

IS and distribution groups soon realized they were working toward common goals and formed an eight-member team consisting of an equal number of programmers and engineers.

The team soon moved into a shared office and began a close working relationship. Recalls Havala: "You'd walk around and you wouldn't know an engineer from an IS guy."

The team discovered that warehouse workers spent about 75% of their time walking around picking out small parts from bins. They also found that most errors were introduced by manual annotations or data entry. It soon became clear that a more efficient alternative would eliminate walking, paper records and the need to type in information on computer terminals. After months of planning and study, the team came up with a simple solution: Move parts, not people.

Instead of having people walk aisles to pick parts, Havala explains, factory workers would pluck small, boxed parts from baskets on three giant carousels that rotated in front of them. The carousels — basically 100-foot-long traveling shelves — would be supplied by parts delivered by miles of conveyor belts and controlled by an on-site IBM 4381.

Although Ford won't say how much the project cost, it was expensive enough to require approval by the company's board of directors in 1985.

Coding began in March 1986 and finished in 1987. All told, some 50 of the department's 150 programmers wrote 600 programs, generating nearly one million lines of Cobol code for 11 systems, according to James Hargreave, a development specialist who was head of the IS team.

The first system went live in March 1987 at a Ford warehouse near Newark, N.J. During the next two years, seven other parts distribution centers switched over to the setup. Depending on its size, each warehouse got between 30 and 60 carousels.

Keeping things moving

To avoid factory shutdowns during the switchover to the new system, Ford runs the 10-year-old Burroughs B2825 systems and the new IBM systems simultaneously while gradually migrating functions to the newer systems.

For customers, the new system's efficiency is not readily apparent. But when they drop off their Ford or Lincoln-Mercury for a tune-up, the spark plugs, grease seals or one of a thousand other small parts will have traveled a much smoother road to the dealer than in the past.

A headquarters IBM 3090 receives dealer orders, which are then passed to the appropriate regional center.

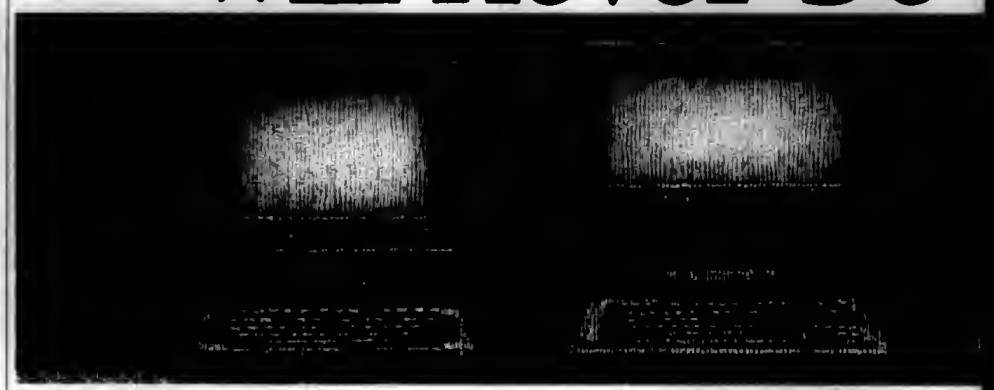
A warehouse worker standing in front of three carousels uses an IBM 3163 display station to start the preprogrammed picking sequence. The first carousel rotates clockwise and stops directly in front of him.

A light helps the worker quickly locate and select the appropriate part from among the 700 varieties stored in 98 bins on the two-story shelves. Parts are boxed, the carousel retracts and another automatically takes its place.

Orders are then "assembled" at the shipping dock and shipped via truck to dealers and parts distributors.

Although IS worked as an equal part-

Our work will never be



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ner on the project, there was never a question about who was steering. Says Havala: "We have found that if the user takes ownership of a project this size or even smaller, there's a more interest in it.

"We'll have the user be the overall project manager, not information systems people, even though having IS in charge is somewhat traditional. We feel that IS supports the business, and therefore business should be the driver."

During coding, IS was careful to rotate staffers in and out of the project. Ford also was careful to involve workers from the United Auto Workers union in the planning, construction and training of the carousel systems.

Involving plant workers at every stage helped employees "take ownership" of the system, according to Ronald Turecki, the operations manager at the parts division. The issue was especially sensitive because some 600 warehouse jobs were eliminated through automation, he explains. Workers were offered new assignments, he adds.

"We used a 'train the trainer' approach," Turecki says. The first operators were trained by divisional industrial engineers and UAW people. The approach was then "cascaded" to other locations.

Despite Ford's early success, industry watchers say it will need to keep on top of distribution if it is going to stay ahead of domestic and foreign competition.

"Ford and the rest of the industry are facing falling profits and soaring costs," says Laura Clark, who covers Ford for *Automotive News*. "They've got to get their inventory under control and keep it there."

Ford customers such as Whaley, the parts manager at Towne Ford in Redwood City, Calif., will be keeping a careful eye on progress. "We have a large plumbing account that we service, and each van earns $1,000 a day," Whaley says. "If they miss time out on the road, you can bet they'll be breathing down our neck to get [their vehicles] fixed fast."

The next phase of the warehouse automation project involves expanding the system to include parts too large for the carousels, such as auto body parts.

For its part, the division's IS and distribution departments say that working closely together on a large re-engineering project was an invaluable educational process. "We learned more about how systems work than in a million years of doing small projects," Turecki says. "And [IS] learned more about our business than in a million years of small projects." •

Maglitta is a Computerworld senior editor, in depth/integration strategies.

Piecing it all together

Ford says its new automated parts distribution system has yielded several key benefits. Among these benefits are the following:

• **Increased capacity.** Under the old "pick and pack" system, an average warehouse worker could handle 80 parts per hour; the figure has now risen to 120.

Similarly, the average parts warehouse used to process 12,000 or 13,000 orders per day. Those same warehouses can now handle 22,000 orders, and more parts can be stored in less space.

• **Simplified receiving and restocking.** Incoming parts are "wanded" in with a bar-code reader at an induction workstation, checked in, assigned a space on a rack and sent down a conveyor belt. Bar-code scanners track materials as soon as they are unloaded from railcars, eliminating paper documents and keyboard data entry.

• **Longer operating hours.** Under the old system, computers shut down at 7 p.m. or 8 p.m. every night. Orders were sent to a Burroughs B2825 mainframe on-site and consolidated. Around 6 a.m. the next day work orders were generated for each factory, which finished daily operations around 2:30 p.m.

"Today, we crank merrily along until 10 o'clock at night in many of our facilities," thanks to on-site IBM 4381s, says Pete McIntosh, supply and distribution manager for Ford Parts and Service Division.

Plant computers exchange data via leased lines with an IBM 3090 at headquarters in Dearborn, Mich., for about two hours before going back on-line around midnight. Besides higher output, the longer hours also give Ford more flexibility in scheduling parts carriers.

• **Improved plant management.** The on-line systems give operating and executive management unprecedented information about how shipping is doing, officials say.

Each building has a personal computer-based on-line Warehouse Information Management System. This lets managers observe parts picking, order consolidation, traffic and other key areas while work is in progress.

"They are actually managing the building with the computer system," explains Mick Havala, manager of the parts operations systems department.

JOSEPH MAGLITTA

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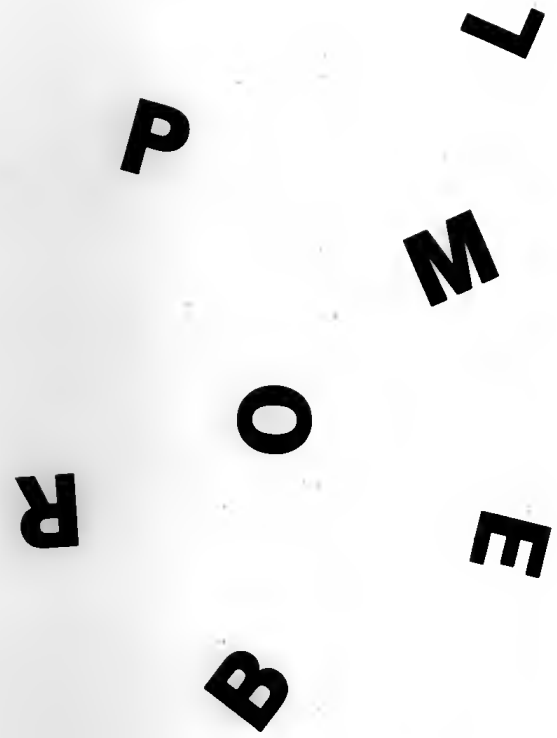

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Where we go from here.

The united systems of Benetton

Decentralized clothier uses international EDI network to sew clients together

INTEGRATING BUSINESS PARTNERS

Benetton

BY LORY ZOTTOLA
CW STAFF

It's been 25 years since Giuliana and Luciano Benetton sold their first sweater on a street in Northern Italy. Since then, the siblings' clothing franchise company has become a global organization whose retail reach has expanded to more than 5,000 shops in 80 countries and whose fashions have graced the likes of Princess Diana and Princess Caroline of Monaco.

While many in the retail industry are struggling, Benetton Group S.p.A. — with the help of networking and electronic data interchange (EDI) technology — has translated its colorful sweaters, shirts and jeans into $1.2 billion in sales in 1989.

Integrating a company of such international scope has taken the efforts of a 100-member information systems staff and networks that let retail clients worldwide exchange information with Benetton as if they were located on the next *strada*.

"The company had an idea for a product that was new, stylish, cheap and aggressively marketed, and that idea helped it succeed," says Lorenzo Colucci, a Benetton watcher at London-based Smith New Court Securities. "But I don't know whether the company would have succeeded in the same way without its computer network. Idea and technology had to go together."

The IS heart of Benetton is located in Ponzano Veneto, a small Italian town just outside of Venice. It is from here that Bruno Zuccaro, the company's 49-year-old IS director, has overseen the organization's IS operations since 1985.

Zuccaro and his team work with a budget of $12.8 million, which is approximately 1% of revenue, and centrally control the IS functions considered most important to the company.

Benetton's international EDI network is one of these key operations. Supplied by General Electric Information Services (GEIS), the network replaced a leased-line setup in 1987 and has since become the IS nexus of Benetton's commercial business, according to Zuccaro. "We were no longer slaves to the old network with its constraints on timing and applications availability," he says.

The GEIS network is at the core of Benetton's ordering cycle, which is initiated by "agents" — Benetton's term for the independent business clients in 73 worldwide locations who act as intermediaries between the Benetton Group and retailers. Working on commission, these agents set up franchises, show twice-yearly collections to retailers and place orders for merchandise with Benetton through the GEIS network.

Interaction between the human and technology networks keeps the highly decentralized Benetton structure together. As a franchiser, Benetton Group has little direct communication with the retail stores, owning only 1% of them. Although the independently owned shops must follow strict marketing, pricing and brand exclusivity guidelines, Benetton cannot legally mandate computer systems use at the retail level, and the majority of shops have no in-store information systems, Zuccaro says.

As a result, Zuccaro relies on agents using the network to bridge the gap between the franchiser's need for information and the franchisee's desire for autonomy.

To order merchandise for his retail clients, an agent dials up the GEIS network from a DOS- or Unix-based workstation and places his order using software developed by Benetton. The order handling system collects the orders and routes them to the appropriate factory. It then updates the agent's order portfolio and price lists, Zuccaro says. The system also handles electronic interchange of mail, reports and files between the corporation and agents and among the agents themselves.

Inside Benetton
Facts and figures from 1988

- 50,000 stores
- 80 countries
- 58 million garments distributed
- $1.2 billion in net sales
- $537,000 spent on communications

Source: Benetton Group S.P.A.

"In the past, we used to have to send handwritten orders, which were at the mercy of time and human error," says Francesca Bertelli, the marketing and sales manager for Manhattan-area stores and assistant to that area's agent. She says the efficiency and fast turnaround of the network are crucial to getting orders right and to the retailers on time.

Benetton's *012 line of stores specializes in selling children's clothing*

The data generated in the ordering process enables the Benetton Group to forecast the total number of orders early in the production cycle, Zuccaro says, so it can make faster purchasing decisions on raw materials and set up a production schedule.

More importantly, this system allows Benetton to keep inventory low and manufacture only what the franchises are paying for, he explains.

"Benetton has taken away the risk and cost of carrying excess stock," Colucci explains.

Furthermore, database access to Benetton's corporate IBM 3090 mainframe through the network enables agents to track orders by customer and item as well as to find out what is in production, in the warehouse or being distributed. Agents can also track customer credit, which allows them to restrict deliveries to those outlets that have exceeded their credit limits, Zuccaro says.

By analyzing data from point-of-sale (POS) systems installed in a number of Benetton-owned shops in Italy, the company knows what's hot and what's not, Zuccaro says. These shops, located mostly in upscale resort towns, receive merchandise earlier than the rest of Benetton's stores and keep tabs on bar-coded merchandise bought by their fashion-conscious customers.

Based on style, color and size data, the firm notifies its agents of popular items and readies operations to handle the late orders. "Agents can place an order that can be turned around in 11 to 15 days," Zuccaro says.

Beyond late-cycle ordering, the information from these trend-predicting shops is stored on the company's IBM mainframe for use in forecasting demand and material and production needs for future seasons.

According to Bertelli, many agents say they would like to see this forecasting system expanded to a universal POS setup. But Zuccaro says the legally mandated autonomy of the franchises makes installing a POS system in each store impossible. "We're very conscious of the decentralized environment," he explains.

However, such obstacles have only sidetracked Zuccaro temporarily. He is now working with university professors in Italy on an expert system that will help the company extrapolate sales data collected from trend-predicting shops.

Ties that bind

Benetton's IS ties to its business partners do not stop with its agent network. To extend its IS influence to new operational areas, the company has devised a freight-forwarding and customs-clearance application using its EDI network.

The IBM 3090 mainframe in Italy prepares the customs and freighting documentation and an application in the GEIS network stores and forwards multiaddressed customs and freighting documents to IBM-compatible personal computers in participating countries. "This electronic process reduces by 15% the lead time it takes for packages to get to a shop. This improves the quality of service to the stores," Zuccaro says.

Initially available in the UK, U.S., Spain and France, the customs clearance process should be expanded to two more countries by the end of this year, he claims.

The realities of the highly competitive retail market are not lost on Benetton, according to Zuccaro. "For us to do well, we must expand continually," he says, "and to do so, we must always be reinventing ourselves and our markets." To this end, the company has already diversified its product line into such goods as cosmetics, home linens and eyewear. More importantly, it is planning to take its retail business into the Soviet Union and Eastern Europe. ●

Zottola is *Computerworld*'s managing editor, special projects.

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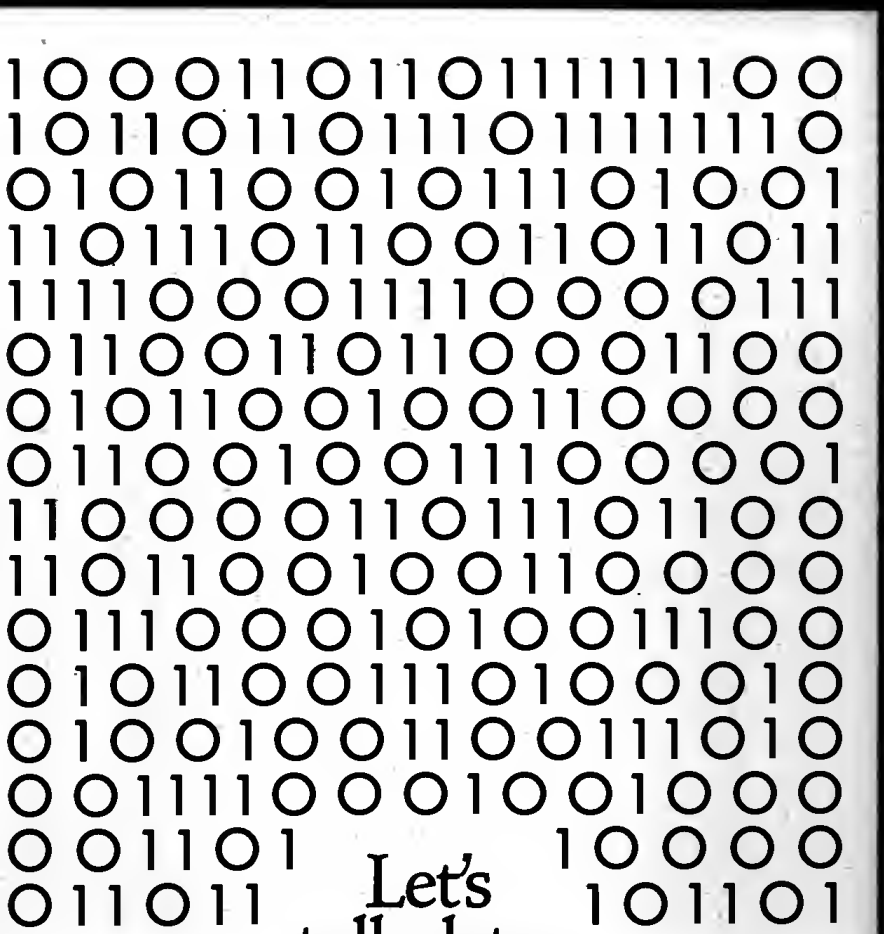

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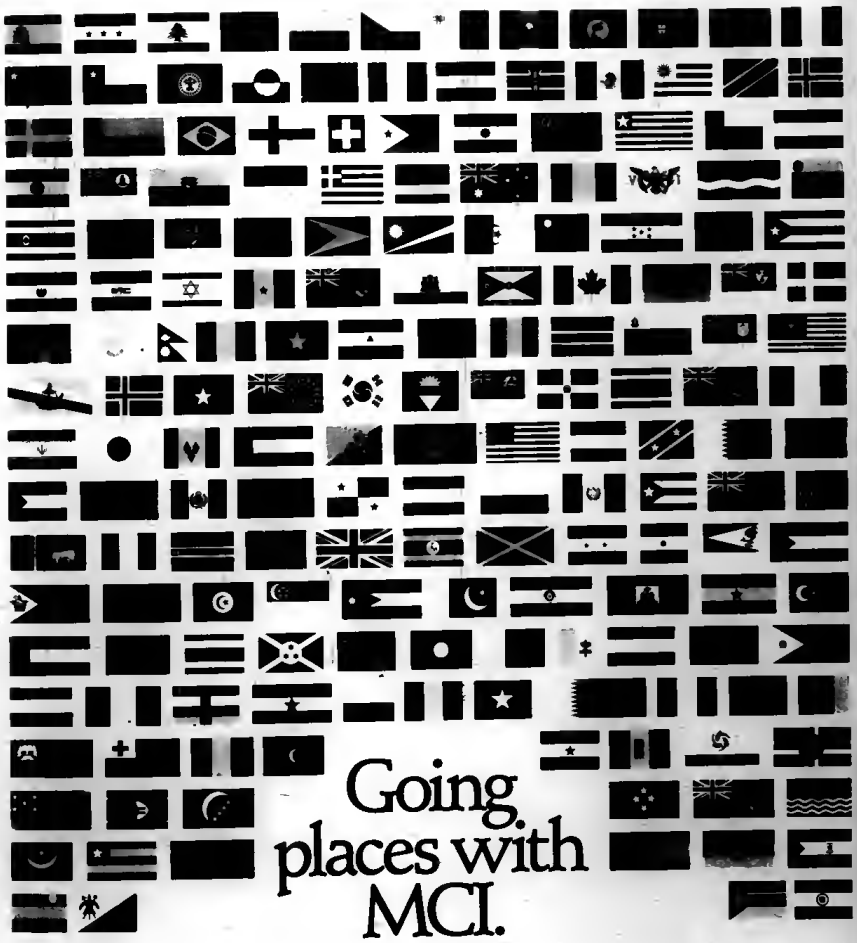

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Transco's information pipeline helps customers go with the flow

Free on-line Transit system cuts down contract turnaround time and speeds customer service

INTEGRATING THE CUSTOMER

Transco Energy

BY DAVID FREEDMAN
SPECIAL TO CW

To improve customer relations, Transco Energy Co. built a new kind of pipeline — an electronic one that lets customers conduct business with Transco through their own personal computers and modems.

More than 100 customers of the Houston-based natural gas transporter now use the on-line system, called Transit, to check rates, arrange routes, send and receive messages — even to set up contracts.

"Any time you can make the customer's job easier and help out their bottom line, it enhances customer relations," says Thomas Skains, Transco's senior vice-president of transportation and customer service. "That opens up new business opportunities for us."

Company officials say that Transit has cut contract turnaround time from six weeks to less than five days. The system also pays for itself by freeing up many employees who were previously burdened with manual data tracking and paperwork chores, they add.

The free system operates over standard dial-up lines at speeds of up to 9.6K bit/sec. and connects to an IBM 3090 mainframe at the company's headquarters.

Energy analyst Paul Ting, a senior vice-president at New York investment banking firm Oppenheimer & Co., says that Transco is on the cutting edge of using such on-line systems to maintain an edge in a highly competitive industry.

"There are so many natural gas pipelines operated by different companies running from the Gulf Coast to the East that it basically looks like a spaghetti bowl," Ting says. One way that transporters such as Transco can distinguish themselves, he says, is to help gas producers automate their business processes, including shipping.

"In many cases, time is critical in pipeline shipments," Ting says. "Any system that can reduce that time will help lock in customers."

One Transco customer, Endevco, Inc., a Dallas-based natural gas marketer, says Transit has saved the firm money by providing better information on pricing and routes and by slicing weeks off the time it takes to create a contract. "Sometimes we use the system for four or five hours a day, trying to find the least expensive routes for our shipments," says John Daugherty, Endevco's director of transportation services. "In this business, if you can save a few pennies per cubic foot of gas, you're talking about a big impact on profits."

Deregulation blues

Transco, a publicly held firm, has annual sales of $3 billion. It ships 1.5 trillion cubic feet of gas per year throughout the eastern and Gulf Coast states for regional gas and power utilities, major oil producers and gas speculators.

The ongoing deregulation of the natural gas industry over the past five years has heated up competition among gas transporters. It also helped Transco bury itself under a mountain of paperwork, which made it difficult to quickly set up and execute customer orders.

Before deregulation, Transco didn't have a big paperwork problem. "We would just buy gas at one end of the pipeline and sell it at the other," Skains recalls.

Deregulation, however, forced transporters such as Transco to open its pipelines to some 70 different types of gas producers, distributors and users.

With the new business came a flood of information to track, such as how much of which customer's gas was being placed into the pipeline when and at which locations for delivery where, when, over which routes and at what prices.

Not only did Transco have to answer these questions for every cubic foot of gas put into its pipeline, but it also had to supply the federal government with this information. In addition, it had to keep information proving that the company was complying with government regulations for pricing and pipeline operations practices.

Customer requests for information on rates, routes and schedules were handled by phone, facsimile and mail, Skains explains. When a customer finally decided on a service, Transco had to sift through the paper trail to set up a contract.

Transco's Skains (left) and Wolgel strive to make the customer's job easier

Because a typical contract can involve over a thousand different locations for putting gas into the pipeline and dozens of locations for delivering the gas, six weeks often passed between the customer's decision and Transco's final preparation.

"The delay was simply unacceptable," Skains says.

On-line contracts

Transco's slow paperwork was preventing it from rapidly responding to customers' requests to set up and execute gas transportation orders, Skains says. So Transco set out to develop a dial-in customer service system.

Most customers were already using PCs in a limited way to make their transportation buying decisions. They would manually enter Transco pricing information into their PC spreadsheets and manipulate the information to try to determine the least expensive way of shipping gas between two locations. Some customers even sent or faxed printouts of the spreadsheets to Transco, which would then manually enter the data into its own systems.

To develop a system that would cut out the wasteful manual processes, Transco assembled a project team of about 20 people that included 15 information systems staffers as well as managers from the gas operations and customer service divisions.

Within about three months they had put together a rough prototype of a system and kept refining it for another seven months. "We brought in input from people all over the company and from customers," says Fred Wolgel, assistant to the vice-president of gas operations and head of the project team.

Flexibility was required; the federal government, for example, announced a new requirement halfway through development, which called for reports on which shipments involved gas owned by any of Transco's affiliates. The system went on-line in December 1988.

Transit lets customers display a detailed graphic map showing any part or all of Transco's pipeline route: Users can then zoom in or out with a mouse to the appropriate level of detail.

By typing in the names of gas receipt and delivery locations — or by pointing to them on a map — users receive a detailed list of mileage and rate information.

This information can be analyzed with a series of "what-if" scenarios that allow users to find ways of reducing costs by changing locations or routes.

For example, a customer can get Transit to provide the cost per cubic foot of shipping gas between Houston and Manhattan and then ask Transit how this price would change if the gas were taken out at Kings, N.Y., which is located a few miles south of Manhattan. This new route is then displayed on a map.

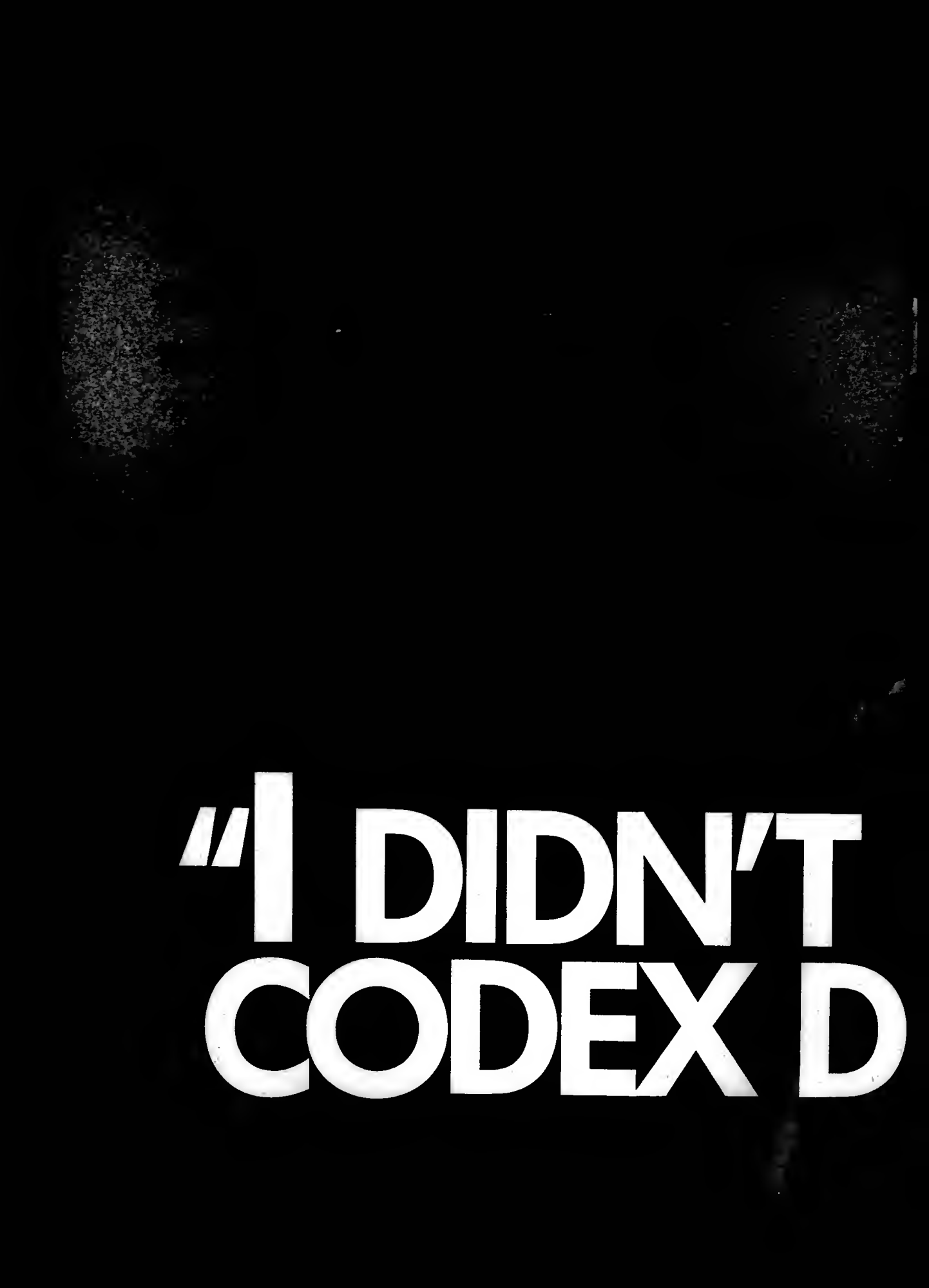
Transit, which resides entirely on Transco's mainframe, also leads the user through the contract creation process. By selecting a command from a menu, the user can then instruct Transit to submit the completed contract for approval.

After the agreement is executed electronically by both parties, the gas can flow. As a safeguard and confirmation, a paper contract is sent out to the customer for his signature.

Contract review and approval must still be carried out at Transco by having people compare the pricing in-

Continued on page 74

Freedman is a free-lance writer in Brookline, Mass.


"I DIDN'T
CODEX D


KNOW
ID THAT."

Voice/data

FROM PAGE 63

critical for the truckers, importers and steamship lines that want to get goods off the dock and on the road as soon as possible, says John Phillips of Stevedoring Services' Marine Information Services subsidiary.

"When you consider that [a customer] can call at three in the morning or on Saturdays and Sundays, it's a big plus," he says.

Stevedoring Services' Quick Check system, which is based on equipment from Speech Plus, Inc.'s Voice Gateway Systems, can handle 14 calls simultaneously, giving callers the exact status of their orders at each stage of the shipping process. It has saved Stevedoring Services about $300,000 per year, largely in operator labor costs, Phillips says.

Voice recognition systems are a fast-growing niche of the voice/data market, generating about $300 million in sales in 1989, according to Venture Development Corp. of Natick, Mass. The research firm estimates that sales will quadruple by 1994. Big users include financial, transportation and distribution firms whose customers have predictable requests and need round-the-clock availability.

"Any volume business, especially one that requires a lot of people to hit a lot of buttons, is a candidate for voice response," says Frank Barbetta, editor of "Voice Processing Newsletter."

Dial 'W' for weather

The technology can also be used to create new businesses. American Express Travel Related Services' 1-900-WEATHER service offers weather forecasts for every major city in the world as well as selected travel information and ski and beach conditions. The application runs on IBM PS/2 Model 80s using software from Intervoice, Inc.

Every hour, a PS/2 at American Express Co.'s New York office dials a host computer at the Accuweather national weather center and downloads weather data collected from around the world. The Intervoice software matches the textual data to a database of about 3,000 words and phrases commonly used in weather forecasts, according to Malcolm Styers, project manager at Intervoice, which custom-tailored 1-900-WEATHER. What sounds like a spoken forecast is really a string of those voice fragments laced together.

American Express Travel Related Services won't reveal many details about the service, but "hundreds of thousands" of calls have been logged since it went into testing last April, says Jeff Bander, vice-president of interactive telephone services. Callers pay 75 cents per minute and spend an average of about two minutes on the line.

While systems such as 1-900-WEATHER are oriented toward dispensing information, voice response is increasingly being used for data entry. Colleges and universities have latched onto the technology as a way to reduce the trials of course registration. For example, about 47,000 students at Ohio State University — nearly 90% of the student body — now register by phone.

The Brutus registration system, named after the Buckeyes' mascot, has resulted in "phenomenal time savings for students," university registrar Eugene Schuster says. "The old process had them carrying written documents from their college office to the registration center to process an add or a drop. We've eliminated the lines and made it possible to register from your own kitchen."

Course coding

Students call Brutus and punch in codes for the courses they want to take. Brutus does housekeeping work such as verifying that students have taken the required prerequisite courses and checking for additional requirements like laboratories. It will even suggest alternate times if a course is filled.

The system checks and approves all fees with the callers and then reads back a summary of all that's been entered.

Brutus is based on an Amdahl Corp. mainframe and an AT&T Conversant voice-response system. At a cost of about $200,000 for equipment and software and a year's development time, the system hasn't been cheap. In fact, Schuster says, Brutus "has probably been a net expense for the university." The benefit, though, is an end to the crowded and error-prone paper system.

Schwab's Wilcox agrees that the biggest benefits of her company's Telebroker system are in flexibility rather than straight cost savings. Conceived after the stock market crash of October 1987 as a way to expand in a volatile market, the Telebroker system is expected to let Schwab ease into new geographic regions without having to set up a full-blown brokerage.

Schwab uses AT&T as a service bureau for Telebroker, with calls coming in to AT&T computers and linking to a host database that Schwab provides. The service can handle 118 simultaneous calls with response times of one to three seconds.

While Schwab uses an AT&T service bureau and toll-free lines to reach a national audience, other voice response systems are cheap enough to be useful on very small applications. For a $26,000 hardware and software investment, the East Orange, N.J.-based data processing arm of American International Group (AIG) automated part of its data center operations by putting user status reports on an IBM voice response unit.

The Problem and Change Area of AIG Data Center, Inc. keeps a database of service requests for each of the 13,000 devices on AIG's national communications network. Users who want to find out the status of a change request they've submitted can call a number at the data center and dial in a code. The system tells who is working on the problem, when it was resolved and the cause of the problem.

The system has boosted productivity by letting the support staff concentrate on solving problems instead of tracking down paperwork, says Patricia Brzozowski, director of information and network services. Savings are expected to amount to a half-person per year.

More ambitiously, some organizations are starting or changing business functions using voice response as a catalyst.

Some 50 newspapers, for instance, are now offering information services on a dial-up basis, says Karen Stabley, director of new electronic media at the *Baltimore Sun* and president of the Newspaper Voice Network, a loose coalition of about 150 member papers.

Instant news updates

Since last May, callers to the *Hamilton Spectator* in Hamilton, Ontario, have been able to dial in and select from 90 informational topics ranging from international news to horoscopes. The Spectel voice information system has given the *Spectator* a hometown edge in its fierce competition with Toronto-area papers, according to Bill Muir, production systems manager.

Spectel is based on a custom-programmed Intel Corp. 80386-based PC linked by satellite to a news service operated by Perception Technology Corp., which provides continuous news updates read by professional announcers and also reads bulletins faxed by *Spectator* editors. The satellite feed from the news service is stored digitally on the PC at the *Spectator*, where it is available to callers, who number about 65,000 per month.

But Spectel has yet to be profitable. The service initially drew 20 sponsors, but fewer than half remain. Muir says the *Spectator* has simply been unable to show that Spectel "had put any extra customers through [the advertisers'] door."

The *Sun's* Stabley agrees that voice information systems have been lukewarm financially, "but I see the potential as tremendous down the road." ●

> "ANY VOLUME BUSINESS is a candidate for voice response."
>
> FRANK BARBETTA
> "VOICE PROCESSING NEWSLETTER"

Let your fingers do the stumbling

While the telephone has a decided edge in terms of installed base, in many ways it's still a lousy replacement for a computer terminal.

Voice response systems, which let callers interact with a computer by pressing buttons on a telephone keypad, are limited in their applications because telephones are so poor at entering text. For example, most systems require a caller to enter the letter "D" by dialing 3-1, which is the key bearing the letter D followed by its position on that key. Thus, keying in the word "cat" means pressing 2-3-2-1-8-1.

"Even typing in seven numbers, I often get one wrong," says John Phillips, president of Marine Information Services, an IS subsidiary of Stevedoring Services of America that operates a voice response system to keep customers apprised of the status of their shipments. "If I have to type 35 numbers, I know I'm going to get one wrong."

Another drawback is that voice response systems often require callers to listen to long menu lists, and many don't handle interruptions well. Hitting the right key at the wrong time can force the system into a loop of hard-to-escape error messages.

Finally, the telephone is limited by its need to have all information in spoken form.

PAUL GILLIN

Gillin is *Computerworld's* executive editor.

Transco

FROM PAGE 71

formation and routes for compliance with federal regulations, Skains says.

When a customer is ready for Transco to start shipping gas, Transit helps the customer set up a daily shipment schedule.

To further strengthen the link between Transco and its customers, an electronic message board, checked several times a day by Transco staff, lets customers request information and receive Transco's replies. The message board also provides announcements, shipping advice and schedule updates.

Skains says Transco was careful to make Transit as inviting as possible for customers. "We wanted to remove any hassle and anxiety felt by customers who were not comfortable with using computers," Wolgel says.

Customers need only a atandard PC and modem; the service is free. "All the customer has to do is type in 'TRANSIT' and a personal identification code, and the Transco-developed software does the rest, dialing into the mainframe, selecting modem speed and so on," Wolgel says.

Training is also done gratis, though Skains says little training is required because Transit utilizes simple menus and plain English instructions throughout.

Standard local- and long-distance phone costs apply to the customer, but Wolgel says the use of value-added networks in major metropolitan areas makes most calls to Transit local calls. To cut customer costs further, Transco helps them buy high-speed modems at a discount.

Reaping the rewards

The strategy seems to be paying off. "Customer response has been terrific," Skains says. "Half of all our new contracts are now set up on Transit." Transco has trained 260 individuals in its 150 companies, and Wolgel says that nearly 100 of those individuals are active users.

Transco is working hard on refining and expanding Transit's capabilities. Next to be introduced, Skains says, is a feature that will let customers instantly identify discrepancies between the volume of gas they plan to put into the pipeline and what is delivered. This is a much sought after piece of data among gas distributors, because without it they are not sure exactly how much of their gas actually goes through the pipeline.

Though Transit was one of the first systems of its kind in the natural gas industry, some of Transco's competitors have introduced their own versions, Skains notes. Tennessee Gas Pipe Line Co., for example, offers customers its "Ten-Speed" automated shipping order processing system. ●

TYING IT TOGETHER

Michael Packer

Do you know your customers?

Many organizations today swear that their customers "drive the business." But when it comes time to change business processes and systems, a shocking number seem to forget those very same customers.

Today's common wisdom is that the real advantages lie in redesigning core business processes — the work flows that are involved with customer orders and service.

Organizations considering "re-engineering" business processes are often advised to look for opportunities to integrate functions that are poorly linked across the firm. Frequently, they are also told to focus on building more effective technological ties to customers and suppliers. However, this misses the whole point.

Any re-engineering project must begin with an understanding of your organization's profit, prices and customers. Once you have built this understanding you can consider work flow and technology alternatives.

Re-engineering business processes without understanding customer needs, profit and cost structure is dangerous. An appliance company selling washing machines to home builders, for instance, might emphasize reducing order-to-delivery time using integrated ordering and manufacturing systems.

Yet home builders care little for rapid delivery; what they want is reliable delivery at the hour they specify so they can schedule electricians and plumbers working at the site.

Unfortunately, few organizations have a sufficiently deep understanding of what their customers care about in purchasing products and services. Some firms neglect to ask their customers about the importance of price, product features, convenience, reliability, image and other product attributes.

Others wrongly assume that all customers are alike or that buying behavior parallels demographic classifications, such as "over 65" customers.

Similarly, few firms understand what really makes them profitable. Which customers are the most profitable? Which product types really make money when you factor in manufacturing setup, storage and sales costs?

Here are some ways to re-engineer business processes toward goals that customers will value:

- Find out what each customer group cares about. Is delivery time, convenience, price or features most important to your customers?

For example, if you are a brokerage house, the "sophisticated stock picker" segment of your individual investors group wants immediate confirmation of the price at which a stock trade order was executed, along with a very low commission cost.

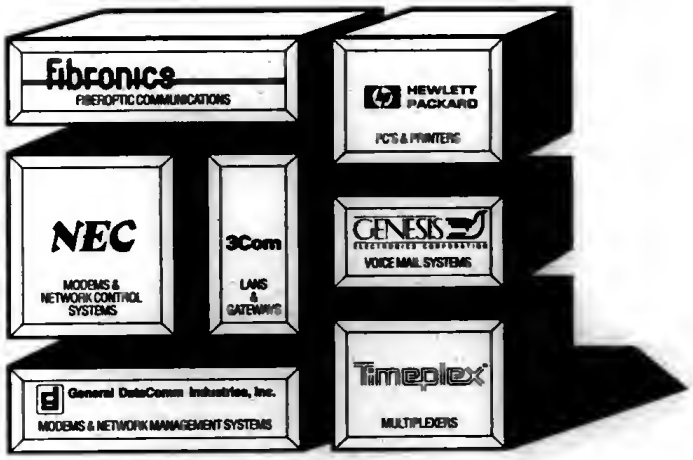
- Analyze your profitability and cost structure by customer and product. In most firms, for example, the cost of slow-moving products is underestimated because the true cost of manufacturing setup time, warehousing and distribution for these products is greater than the cost shown in the accounting system.
- Set measurable goals based on customer values. The goals for process redesign must be quantitative and tied to the product attributes customers say they care about most.
- Analyze the existing process. Which activities consume the most time? The most key people? The most money? Which are the most complex or unpredictable? Where do errors occur in the process? Tracing the flow of transactions is a standard but highly beneficial task.
- Look for changes in the price/performance of key technologies. New technology may help you fix the worst aspect of the process at a minor cost or make fundamental changes without destroying profitability.
- Learn from the best in customer service. Instead of looking only at your competitors, seek out companies that are renowned for their customer telephone service, order processing, service and so on.

Look at firms that have intelligently rebuilt business processes, such as Citibank Visa's customer service, American Express Co.'s travel-related services and Caterpillar, Inc.'s spare parts service. All have invested in understanding customer needs and the economics of serving different customer segments.

As your firm tries to leverage information technology, make sure you start at the beginning. Visit customers to talk about the impact of the process you are retooling on the service those customers receive.

Include good marketing and cost-accounting people on your team as well as representatives of the business area you are rebuilding. Then you'll be in a position to create a competitive advantage — and customers will be willing to buy. •

Packer is vice-president and director of the information technology group at The MAC Group, a Cambridge, Mass.-based international management consulting firm.



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AT&T
Network Systems

Politics

CONTINUED FROM PAGE 65

Natan approached integration by conducting a re-engineering study that zeroes in on Cigna's business strategy. The effort involves interviews with users to help focus the business strategy.

Once the strategy is clear, the IS staff examines the systems and "takes the approach of 'How do we meet that strategy, unconstrained by the systems that exist today?' " Natan says. That way, there is no question that IS is only acting to support the business plans.

Another built-in tension arises when user departments think of information as their own, Cooke says.

"Nobody owns the data," he says. "People have stewardship responsibility for the data to protect it and have an obligation to share it with the people who have the need to know."

Another way companies can overcome fear and avoid squabbles is to get users to buy into the project early, Cooke says.

"If you have the right kind of working and partner relationships to begin with, that provides you with a springboard to move forward with less difficulties," Cooke says. IS managers who lack these relationships may be in trouble, he adds.

Natan agrees, saying integration champions should spend time with middle managers to help them understand the roles they play in the process. "You can't just ignore them," he says.

When the integration takes place, it may cause jobs to be eliminated or changed, and workers may resist retraining. One way some companies smooth over the issue is by relocating jobs to other locations or by totally restructuring departments, according to M. Victor Janulaitis, CEO of Positive Support Review, Inc., a change management consultancy in Los Angeles.

"You have got to shake the tree in order for people to do their jobs differently," Janulaitis adds.

Flooding the opponents of such a project with information is also important.

"The No. 1 enemy of internal politics is facts," says Art Schneiderman, vice-president of quality and productivity improvement at Analog Devices, Inc. in Norwood, Mass.

At Analog, Schneiderman says, an integration philosophy has been in place for years. "When you start to limit accessibility to information, then you create a barrier against cross-functional problem solving and cross-functional understanding," he says.

Historically, each Analog manufacturing division maintained its own information systems for nonfinancial data. If a customer wanted information on the product reliability of another division's product, for example, "We had to find out the product and the division and then go to them to see their information on reliability," Schneiderman says.

Moreover, he says, many divisions had different methodologies for measuring reliability, which often left customers confused.

Today, Analog is working to correct problems by standardizing measurement processes and following the Japanese technique of quality function deployment, Schneiderman says, which is the ability to design products rapidly that meet customer needs while ensuring the soundness of the manufacturing process.

However, IS managers and consultants say that information dissemination won't work in companies where middle management's fears make whole departments reluctant to participate in integration projects.

Cooke says that high-level managers as a rule tend to take a more global view of how integration can help the company. In contrast, midlevel managers tend to take a bit narrower view of their jobs, he says, and are likely to be fearful of and resistant to the process. They often will try to slow or sabotage a project by saying that it won't work, that it is too expensive or that it is wrong, Cooke says.

"What they are really saying," he explains, "is 'Don't fiddle with my turf.' "

At the middle management level, Natan adds, "You are now dealing with people who feel changes are not in their control and are going to affect them. The threat is higher to the middle manager, and therefore resistance is higher."

Beyond fear

To get beyond the fear of integration at American Steel, Potter gathered users from each profit center and asked what kinds of information they would not be willing to share with other profit centers. They were told, "If there is data that you don't want other folks to see, we will lock it up and not let them see it," Potter says.

In 1984 a shared inventory database was up and running, giving American Steel's five subsidiaries the ability to search one another's stock lists for the best price on steel for customers. The units realized that the more information they had about each other, the better off they would be, Potter recalls: "They would say, 'Gee, it would be helpful if I could see your data. I'll trade you my data for your data.' "

This kind of sharing has helped the company's bottom line. "In 1982, we were an $80 million company and marginally profitable," Potter says. "In 1989, we were a $115 million company and very profitable."

During that period, American also increased its market share while trimming the number of employees from 500 to 300, Potter says. Moreover, 1989 inventory levels dropped to $25 million, down from $40 million in 1982, he adds. •

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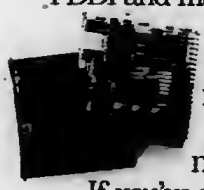

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Eliminating the fudge factor

When design and manufacturing share information, less time and money are lost on guesswork

BY SUZANNE WEIXEL

The American people can sleep well at night, says Louis W. Piper Jr. General Dynamics is now able to assemble an M-1 tank commander's weapon station hatch that seals completely every time.

That was not always the case, says Piper, chief engineer of computer-aided design and manufacturing at General Dynamics' Data Systems Division in San Diego. Until the company realized that the secret to rapid, high-quality production lay in the design process rather than on the shop floor, achieving a 100% seal was something of a long shot. In a nutshell, Piper says, when General Dynamics tried to put together the pieces of the commander's weapon station for the M-1, the hatch just would not fit.

At General Dynamics, the decision to put design on the front line of change emerged from the realization that faulty design methodologies were leading to production variations that cost thousands of hours and impaired quality. "Multiply thousands of hours by $50 per hour, and you'll know why changes had to be made," Piper says.

This realization did not come all at once. It was actually a by-product of statistical process control techniques, which were applied in an effort to reduce product defects, scrap and rework. According to Piper, the statistical process control program generated huge cost savings but also exposed the cost related to poor or difficult-to-manufacture designs — specifically, unrealistic tolerance specifications, poor processing methodologies and improper assembly schemes.

General Dynamics decided that the key to successful design for manufacturability was to integrate the right people with the right information system tools at the outset of product development. "That way," Piper says, "all the stupid mistakes like designing a hatch that won't seal can be taken care of before a design is frozen."

General Dynamics' Piper *set his sights on the design stage of manufacturing*

What the company did by reshaping the relationship of product design to manufacturing is indicative of a new orientation in manufacturing management that is summed up by the catch phrase, "design for manufacturability."

Design for manufacturability means engineering products for ease of assembly. It means considering all the variables involved in taking a product from concept to delivery at the very beginning of the design process and constructing product specifications with those factors in mind. By making considerations such as productivity, quality control and manufacturing efficiency part of the design process, it addresses such indirect expenses as rework, engineering changes, testing, documentation and inspection.

Bart Huthwaite, founder and director of the Institute for Competitive Design, a consulting and training firm in Rochester, Mich., says he thinks adjustments of this kind are long overdue at many manufacturing companies. The design stage of product development drives 75% to 80% of total manufacturing costs, he says, and "if the design isn't right when it reaches manufacturing, it's too late to be competitive."

Huthwaite says that U.S. manufacturers started automating in the wrong place; namely, the factory floor. In their zeal to get automation up and running, he says, manufacturers set in place risky and expensive systems for applications such as material handling, without even considering the links between product design, cost and quality.

"The cost that we see on the factory floor is just the effect," Huthwaite says. "The cause is imperfections in the design itself." On the other hand, he says, when design for manufacturability is implemented effectively, manufacturing costs can be reduced from 25% to 75%.

At General Dynamics, implementation took the form of a corporatewide concurrent engineering effort, which brought design and production engineers together on a common base of shared information.

The concept of cross-functional design teams is not new. However, since integrated information technologies have freed up the flow of data within a company, manufacturers are able to do more than simply require design engineers and manufacturing process engineers to discuss product plans that have already reached the blueprint stage.

When information exchange is continuous and instantaneous,

Weixel is a free-lance writer based in Framingham, Mass.

Fudge factor

FROM PREVIOUS PAGE

all sorts of productive adjustments start to take place, says Tom Inglesby, editor of *Manufacturing Systems* magazine. When manufacturing engineers have access to product design data, they can provide the designers with input as to what the factory is capable of producing. If someone from purchasing has access to the files, he can take steps to cut lead time by ordering materials in advance.

Inventories of components can be maintained or reduced, depending on the requirements of the parts being designed.

In addition, IS can provide software analysis tools that can be used to predict the effects of known assembly variables, thereby eliminating prototype problems before they occur.

General Dynamics had previously used its own version of design teams, called produceability teams, Piper says, but because of a lack of communication, they were not very effective. In the past, the data systems division's primary responsibility had been maintaining the design engineers' CAD systems. Once top management gave the go-ahead for concurrent engineering, the data systems division's role was redefined.

Under the CAD/CAM group, it was given a charter to identify and implement tools to support the concurrent engineering effort.

"We needed tools that could help manufacturing determine assembly problems inherent in a design and tools that could help us communicate those problems back to the designers," Piper explains.

Specifically, they wanted to identify the feasibility of using software programs to simulate tolerance fit-up problems, such as those that prevented the weapon station hatch from sealing properly.

Selection process

Data systems selected two personal computer-based analysis programs that they believed could be used throughout the company to eliminate design/assembly problems; thereby reducing lead time and cost and improving product quality.

One program is a variation simulation analysis program from Applied Computer Solutions, Inc. in St. Clair Shores, Mich. The other is a tolerance charting program that was made available to General Dynamics by Ford Motor Co. It is used to ascertain proper process tolerances, establishing proper raw stock size and sequencing steps to be used in assembly.

Since they were implemented in 1987, the two programs have already saved the company several million dollars by cutting down on the need for multiple iterations of prototypes and reducing the number of process-related problems, Piper estimates.

"We saved 30% to 40% of the usual assembly time and, as the saying goes, time saved is money earned," he says.

In the past, it was necessary to build a prototype before any inconsistencies between design and assembly could be found. If a hatch or some other part didn't fit the first time, Piper says, the manufacturing engineers would yell at the design engineers, who would yell back before making some engineering changes so that a new prototype could be built.

"Sometimes we'd build 10 or more prototypes," Piper says. In addition to the time and cost benefits achieved, he says, there is a confidence factor that, although hard to quantify, adds significantly to productivity and quality.

Boeing's Beckelman *believes in a strategy of design and team concepts*

"If we had to design a product without these tools, we would not have confidence in the quality of the prototype," Piper says. "Without these tools we don't quite trust ourselves."

According to Theresa Williams, a principal consultant at McDonnell Douglas Manufacturing and Engineering Systems Co. in Detroit, it is enterprisewide integration of CAD files that makes concurrent engineering work. The benefit of entering all design data in a CAD system is that once the design data is in digital form, it can be easily transferred from design engineering to other members of the design team.

At Navistar International Transportation Corp. in Chicago, broad-based access to design files helped to cut delivery time on a major product modification from over two years to 11 months.

In November 1986, Navistar began talks with U-Haul International, Inc. about building a truck with a lower entry height. "They wanted the new design so that it would be easier to fit furniture in the back," explains Dean Stanley, vice-president of Navistar's corporate technology and chief technical officer.

At both Navistar's truck manufacturing site in Indiana and engine manufacturing site in Illinois, design drafting has been 100% computerized for almost five years. Recently, the company began using its CAD systems to drive its electronic files throughout the organization, facilitating concurrent engineering efforts and improving design for manufacturability.

On the U-Haul project, the design team, which included representatives from engineering, manufacturing, marketing, supplier companies and U-Haul, could all access the design files for use in testing and simulations.

Lowering the chassis' height required making changes to parts of the truck that support the load weight — such as the air suspension system, the frame system, the wheel ends, the tires and the axle. Significant testing had to be done before the prototype was built.

"It's all safety-related," Stanley says. "Every time we made a design change to a part, we had to go back and test the effects on the whole assembly."

According to Stanley, computer-aided engineering tools such as finite element analysis and computer simulation of structures were used by both Navistar manufacturers and suppliers.

"Although the suppliers didn't have direct access to our design files, we sent them tapes. That way we knew everyone was using the same data to conduct tests," Stanley says.

It also saved time. "It means a one-step process," Stanley says. "A part goes into a file once, and that file can be used for design concept, analysis, modeling and parts creation. It can be transferred to suppliers and to manufacturing." The result is a more completely specified, higher quality design.

Trucks a-rollin'

In the spring of 1987, Navistar built a prototype, dropping the entry height from 48 in. to 24 in. By September 1987, the new trucks were in full production.

"We can't attribute all the time savings to CAD," Stanley says, "but it is a significant factor."

Making CAD design files available outside of the design engineering function is a major step in the right direction, but it is not all there is to design for manufacturability.

Organizing the files efficiently and developing design standards also facilitate design data access and can be accomplished through a process known as group technology. Group technology involves identifying parts that share common characteristics. These parts can then be coded, and the codes stored. Designers can then access a file and know immediately whether or not there are existing parts that could be used in a design.

Manufacturing Systems' Inglesby says he believes that in addition to simplifying the assembly process, group technology results in fewer parts being designed into new assemblies, which in turn results in much

Continued on page 82

Reducing abrasion

BY MANFRED NOWAK

Information systems and manufacturing personnel are being thrown together more often and more closely at many companies, and the relationship is not always a cordial one.

"It isn't working," says John Conway, vice-president at John Diebold & Associates in New York. "Each area is under the impression that the other is a burden to the successful accomplishment of its tasks."

Engineering often views IS as a "counting" function that inhibits its production, according to Conway. From the point of view of these manufacturing people, he explains, it seems as if they keep feeding information to IS but get nothing in return. IS, on the other hand, is trying to implement Manufacturing Resource Planning II (MRPII) but doesn't get cooperation from manufacturing because it hasn't bought into the concept of MRPII.

One of the situations Conway sees occurring is that manufacturing people are purchasing computer equipment without regard to the IS department. Their impression is that IS is mainframe-oriented and doesn't understand factory equipment. Furthermore, since factory operations usually control their own budgets and are seldom given direct orders from top management to go through the IS group, they buy what they want. Only when the manufacturing community wants to interface the new equipment with existing information systems does it acknowledge a need for IS assistance.

Jonathan Cole, an analyst at Advanced Manufacturing Research, Inc. in Cambridge, Mass., sees a related problem with manufacturing personnel buying their own systems. "As manufacturing becomes more and more educated in computers and how they can solve their problems," he says, "a direct conflict can occur wherein IS is no longer the sole expert in computers. This can then cause a banging of heads when manufacturing suggests that what IS recommends is not what they need.

Strained as relations often are, Conway maintains that it is possible to mend fences and achieve cooperation.

At some companies, Conway says, IS personnel are taking a new tack; "adding value by using their expertise in finding solutions that help the manufacturing part of the company."

Bruce Jenkins, vice-president at Daratech, Inc., a computer-aided design, manufacturing and engineering market research and consulting firm in Cambridge, Mass., stresses that previous to computerization of manufacturing, IS was more concerned with automating single departments rather than integrating systems across the entire enterprise, which is the necessary approach when working with manufacturing.

Wickham Skinner, the James E. Robinson Professor Emeritus at Harvard University, suggests that one way of improving relations is to make sure that the IS people who are involved in automating manufacturing are tied to, measured by and rewarded by the manufacturing people they are serving.

In other places, says Bill Kelly, a partner at Andersen Consulting in Cleveland, companies are trying to bridge the gap by deputizing individuals to act as liaisons between manufacturing and IS. One of his clients, he says, "trains manufacturing engineers in data processing so they can act as interpreters between IS and manufacturing. This does tend to close the communication gap but still doesn't help with the expectation gap."

The expectation gap, Kelly explains, is a phenomenon born of familiarity with personal computers on the shop floor. While PCs cropped up in manufacturing plants, manufacturing personnel got used to doing things for themselves and doing them quickly. Now they question why it takes so long for IS to accomplish things on the mainframe. •

Nowak is a free-lance writer based in Elmer, N.J.

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Continued from page 80

of the cost savings generated by designing a product for manufacturability.

"Why reinvent the wheel?" Inglesby says, "when instead of designing a product with a part that the company has never built before, you can use a part that is currently being manufactured, or may even be stocked in inventory."

According to Stanley, the design database that contains all the product files is critical to product development. By characterizing and grouping all the parts that Navistar has designed and used in the past, design engineers no longer have to wade through piles and piles of paper files and drawings to find what they need.

"It used to be easier just to design something new," Stanley says.

At Navistar, group technology is also being used in the development of corporatewide design standards. By the end of this year, Stanley says, the standards should be completely automated so that design engineers will have specific guidelines to follow when conceptualizing new products.

According to Robert Johnson, vice-president of Cimdata, Inc., a consulting company with offices in Ann Arbor, Mich. and Wellesley, Mass., solid modeling is also an effective aid in the production of workable and manufacturable designs.

Navistar International's Stanley

"If a model is created using solids, the system can make realistic drawings, providing different views and cutaways all online and in real time," Johnson says. Not only can the part be defined, but the way that it fits with other parts can also be defined.

The drawings generated by solid modeling applications are clear and easy to read. Interested parties not used to reading drawings — for instance, a financial analyst — are thus in a better position to manipulate design data for testing or reporting purposes.

Solid modeling is a well-respected fixture at IBM Lexington, which is the home of the Selectric typewriter among other products. In 1982, $350 million was invested to automate the plant and, according to Norman Galloway, manager of information systems, a substantial percentage of the investment was devoted to technologies — including solid modeling — that would reduce the amount of time and money spent on prototypes.

"Each time we had to cut a single mold, it cost us $200,000," Galloway says. Sometimes the latches on the prototype would crack; sometimes the cover would separate from the base. Then, he says, "we'd have to go back and cut a whole new mold." When they finally got a prototype that withstood all the testing, someone would take a good look at it, decide it was ugly, and it would be back to the drawing board.

Using IBM's own Catia CAD system, the development engineers could use solid modeling techniques to define the geometry of the part in a way that was clear and easy to read. The Catia design files were sent to manufacturing engineers for use with mold simulation analysis software and on to the human factors engineers for human factors and aesthetics testing.

According to Galloway, the solid modeling files are particularly useful for aesthetics testing. They enable the aesthetics engineers to get a very good idea of what the product will look like when it is assembled. "It shows where the seams will fall, things like that," Galloway says.

Recently, IBM also began sending the same geometry design files directly to the

Continued on page 86

Back to the future: an early integration model

Almost inadvertently, Digital Equipment Corp. stumbled onto techniques supporting design for manufacturability before anyone had even thought to give them a label.

DEC started its RA-90 disk drive program at the end of the 1970s. Since the program was completely new, everything — product design, process design and manufacturing facilities — had to be built from the ground up.

According to Keith Glick, manager of engineering and technology for the Storage and Information Management Group in Colorado Springs, the concurrent development of the entire program required DEC to push technology in many different areas. "In order to achieve design-for-manufacturability goals of shorter lead time and high quality, we had to understand the margins between performance and design," Glick says.

DEC's Glick

From the beginning, the RA-90 program has run a basically paperless design process, according to Glick. All design definitions are in the form of data files, which are used with computer-aided engineering analysis tools for simulation testing. This enables the Storage Group to bring its designs to a more mature state before building prototypes.

"In a way, we were attempting to do with information and data what in the past had been done by the manufacturing process itself," Glick explains.

Often, the need for engineering changes arises when an assembly reaches the factory floor, and it is discovered that the plant cannot manufacture a product according to the design specifications. In addition to using design data for assembly simulation testing (as at General Dynamics), DEC was in a position to identify and communicate changes that occurred as the plant itself was developed.

"Manufacturing engineers were developing facilities at the same time the product was being developed," Glick explains. "When changes in plant development that might facilitate manufacturability were identified on the manufacturing level, that information was accordingly passed along to the design engineers."

The flow of information through electronic mail and across DEC's global network was vital to the success of the program. Members of the design team were based in Colorado, Massachusetts, Arizona, West Germany and Puerto Rico, with suppliers located around the world. They could exchange product description data and product design databases with other team members at any site, and they had real-time access to all product information.

Ben Kaminski, president of CAM-I, Inc., an Arlington, Texas-based consortium of manufacturers, is not convinced that design for manufacturability and concurrent engineering are effective enough. According to Kaminski, "Just because management issues an order to work concurrently, it doesn't mean the walls between departments are going to come down."

Kaminski says he believes that simply using design for manufacturability to get a product to market is not enough. "You design it, then build it, then forget it," he says. "There is no room for future improvements. According to Kaminski, the way to close the loop is to provide a means for including customer reaction in future designs.

The way the RA-90 program was developed from scratch put DEC in a position that made it easy to extend design for manufacturability into the future. By linking design files with a relational database system, DEC has established a traceability system for the RA-90 components.

According to Glick, as components are manufactured, they are assigned a serial number. As the components are assembled into a drive, the drive is assigned a serial number. If a product fails at some point down the road, DEC can go back and track the serial numbers to determine where all the disks fabricated with the same processes as the failed disk are located.

According to Glick, "Not only is service enhanced, but we can use statistical analysis to determine if there is a design problem that warrants a change."

SUZANNE WEIXEL

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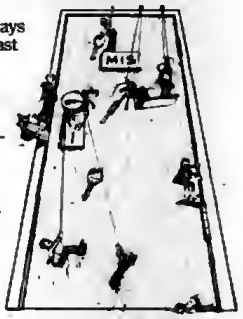

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Bringing sales and marketing to the team

BY LARRY STEVENS

Manufacturability is a team sport that may be best played by more than just the design and manufacturing departments. Specifically, some consultants say — and a few companies have demonstrated — that there are benefits to drawing sales and marketing into closer collaboration with these other two departments. Among the advantages cited are reduced time to market, increased responsiveness to changing customer demands and the ability to fabricate smaller lot sizes and shorter production runs.

Allen-Bradley Co. is one of the first corporations to start bridging the gap by connecting sales and manufacturing. The production cycle at the company's Milwaukee, Wis., plant, for example, begins when distributors and salespeople place orders. They can use any personal computer and modem to dial up Allen-Bradley's IBM 3090 and log on to the order-entry database.

The order-entry system sorts orders, creating batches by customer and scheduled delivery date. A subsystem then converts the data into a format that can be read by factory-floor controllers. The system sends orders to a master controller that translates them into production requirements, which in turn are transmitted to Allen-Bradley's Programmable Logic Controller-3 (PLC-3). When a manufacturing cell signals that it is ready to receive a new order, the PLC-3 transmits the data to the cell's PLC-2, which instructs each machine on the assembly floor what to do.

Fox says ***linking sales and manufacturing is no technical challenge***

As far back as 1985, Allen-Bradley started the process in the same way, by electronically batching order data. The batched data, however, would then be printed out on the shop floor. The missing electronic link between sales and manufacturing was that someone had to type that hard-copy list of orders into the controller.

According to Ken Fox, senior systems engineer, the direct link from sales office to assembly machine was a joint project of information systems, engineering and manufacturing personnel. Spanning the short gap that still existed between sales and manufacturing by downloading data from the central IBM mainframe to computers in the manufacturing group was relatively straightforward work, Fox says. Information systems and manufacturing staff simply had to agree on a format for data transfer and the creation of a physical link.

"The word from the top was 'We've integrated the business functions and the plant; now you guys are going to have to link them both together,' " Fox explains. "Once we were committed to getting it done, the technology didn't present a problem."

Another company that has extended teamwork in the interest of manufacturability beyond the confines of the design and production areas is Navistar International Transportation Corp. in Chicago. According to Dean Stanley, vice-president of corporate technology and chief technical officer, response time to problems that surface in the field has been reduced because service engineers can access the design files for detailed parts and assembly diagrams. The files can also be used to create sales data bulletins and corporatewide standards for product design.

"There are plenty of opportunities to expand this even further," Stanley says. "We are still on the learning curve."

Even if Navistar has not fully explored the possibilities of this type of information exchange, it is still ahead of the pack. Even among firms that have woven tight systems connections between design and manufacturing, extensions into sales and marketing are rare. In most cases, orders are still sent to the factory by interoffice mail, and the production employees and marketers never cross paths.

According to Joe Ferreira, a principal at Index Group, Inc. in Cambridge, Mass., the obstacles preventing the linkage of these areas are usually organizational, not technical. "In many companies, even a fax network would be sufficient technology to link these functions," he says. "We don't really need to invent new data transfer systems; we have to decide what the departments will do with the new data once they get it."

Before electronic links can be created, Ferreira adds, the corporate climate must be altered to let various functions share information on a continual basis. In many companies, he says, three or four departments must sign a sales order before it reaches the factory floor, which stretches delivery schedules.

David McKay, a principal at Nolan, Norton & Co. in Lexington, Mass., agrees that the actual transfer of the data is not a problem. "If you want design engineers to have access to marketing data, all you have to do is give engineers the password to the marketing database," he says. The difficulty at present is that designers are not capable of understanding marketing data, McKay explains.

Because organizational changes must create the links, IS is not expected, in most cases, to lead the movement. But, Ferreira says, "IS can be a catalyst in the sense that it stands prepared to provide the glue that lets everyone talk to each other once they are ready to do so." •

Suzanne Weixel contributed to this report.

Stevens is a free-lance writer based in Springfield, Mass.

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Continued from page 82

vendor that supplies the prototype molds. This reduces the time it takes to receive a mold simply because the supplier has the design in hand sooner and can take action such as preordering materials. It also ensures that the supplier has accurate product specifications, which aids in improving quality.

By employing concurrent engineering and other principles of design for manufacturability, IBM has eliminated costly scrap as well as the need for numerous prototypes. The design-to-manufacturing cycle for a typewriter cover has been cut down to a maximum of 12 months. "Technology has taken the lead time off the critical path," Galloway says.

The concepts that support design for manufacturability, such as concurrent engineering and cross-functional design teams, have been kicking around for 10 to 15 years, Inglesby says. One reason they have taken so long to catch on, he says, is simply because they make so much common sense. "It's too simple. American manufacturers have traditionally been willing to spend money on buying the robots, not on the things that actually make the robots work," Inglesby says.

According to Huthwaite, U.S. manufacturers have finally realized their original efforts to automate the shop floor did not produce any significant return on investment. As a result, they are not only embracing design for manufacturability techniques but are also integrating them into their overall business plans.

The Boeing Co. has established its process and system strategy, a long-term business initiative that outlines a new way of doing business throughout Boeing organizations, to improve quality and produce products more efficiently.

According to Stan Beckelman, general manager of systems integration at Boeing Computer Services, the strategy includes implementing such design-for-manufacturability techniques as the use of design and the building of team concepts, a product dataset that electronically defines all products, a standardized single bill of material with a single data dictionary for the corporation and the use of three-dimensional solid modeling and electronic mockups for all products.

In pilot tests to determine the usefulness of its strategy, Boeing found that design for manufacturability techniques provided opportunities to reduce the number of design rework requirements by up to 80%.

General Dynamics' corporatewide concurrent engineering effort is a direct result of top-level management interest in improving profitability in manufacturing. "There's more competition now, and margins are tighter," Piper says. "The bottom line is there is a smaller bottom line." According to Piper, top management does not just support the effort; it insists on it and is making sure that standards are set on how the design-for-manufacturability tools will be used in the concurrent engineering effort. He adds, "We can always do more if we learn to do it smarter. The design-for-manufacturability tools make us smarter." •

Doing it your way

Starting your own business can be a dream or nightmare

BY BERNARD J. DAVID

Scenario 1: After years of work you've developed a great software product, and you've been thinking about starting a company to market it.

Scenario 2: Your best friend started a company last year to sell computer software, but he's not doing well. He wants you to join him as a partner to manage the technical element of the business.

Scenario 3: You've heard that your organization is about to have a big lay-off. You wonder if it's time to start that consulting business you've always dreamed about.

Scenario 4: You were reading through a computer trade publication and saw an advertisement for a wonderful new product. At the bottom of the article is a note that says, "Dealer inquiries welcome." You wonder whether you should contact the company.

Kevin Pope

The lure of entrepreneurial opportunities seems to be part of the American dream. If you're like many information systems managers, chances are you have dreamed of some day leaving corporate life and setting out to start your own business. Even in tougher economic times, the siren song of entrepreneurship is not easily silenced.

But what is *really* involved in becoming an entrepreneur? How do you make a business successful? There are many elements to consider before you launch a venture or buy an existing business. In fact, the more you consider all the elements involved, the more you may realize that the grass may not necessarily be greener on the other side of the organizational walls.

You can start on the entrepreneurial road in two ways: by forging ahead and relying on your own smarts or by careful analysis and planning. Successful entrepreneurs have done it both ways. But in today's more competitive market, it pays to look before you leap.

There is actually an inverse correlation between the inclination and ability to start an entrepreneurial venture.

In your youth, you are much more likely to have the necessary initiative, drive and risk-taking inclination to start a business. As you get older, your initiative and drive usually diminish, yet you have more experience and ability to contribute to the productive operation of a firm. Your taste for risk dulls over time as you build up more of an estate because you have more to lose.

So the first step in determining your chances for success with a new venture or an existing business is to assess your entrepreneurial tendencies. You must ask yourself a lot of hard questions about personal risk preferences, drive, initiative and priorities. Once you assess your own inclinations, you will then be able to determine whether you are better suited to start a business, buy an existing one or work for a large corporation.

Assuming you are still on the entrepreneurial road, what next? If you have the inclination to be an entrepreneur but do not know precisely what kind of business you'd like to head, you should start a search for business ideas or existing business opportunities.

Places to look for business ideas include product-licensing information services; patent brokers; industry and trade contacts, such as customers, distributors, wholesalers and competitors; former employers; not-for-profit institutes; corporations; universities; professional contacts; consulting projects; and networks of friends and business associates. Sources of existing

David is president of General Information Services, Inc., a Wilmington, Del., consultancy.

- **Remember the Four P's**
- **The corporate grass may really be greener**
- **Good research is key**

business opportunities include available franchises, existing businesses provided by business brokers and businesses you contact directly.

Once you've identified a business to pursue, the next step in the entrepreneurial process is commonly referred to as the "go/no go" decision. Now is the time to take the business through an exhaustive screening process. You must consider issues such as industry and market conditions, economic and harvest concerns, competitive advantages, the type of management team you'd like and critical risk factors in this screening process.

• **Market issues.** Among the market issues to consider are the following: What is the target market? What is the market's size and what share of it can you capture?

IF YOU ARE starting up your business and it will take more than three years to break even and then turn a profit, you may not have an attractive venture.

What is the market's growth potential? Who are the players in the market? What are the distribution channels that competitors have in place? What kind of gross margins can be preserved in the market? Can your organization become a low-cost producer, or will it always fight to compete with rivals on cost?

• **Economic and harvest issues.** Before you begin your venture or buy a business, figure out what you can get out of it. A repeat business affords you great certainty. This certainty, if profitable, can translate into great value at harvest, or sellout, time. Does your business have this capability? What are your business' profits after taxes?

If you are starting up your business and it will take more than three years to break even and then turn a profit, you may not have an attractive venture. What is your potential return on investment? Often, a company has strategic value to other firms, and even though it may be doing a low level of sales with an average return, its strategic value is so important to the other company that its harvest value is greatly inflated. Does your potential opportunity have such intrinsic value? How much capital is required to actually start or buy the venture?

• **Competitive advantages.** What advantages over the competition do you possess in the marketplace? Why would people want to buy your product rather than another? Do you have pricing advantages? What attributes does your product have that differentiate it from the rest of the market? What entry barriers can you erect *vis-a-vis* competition?

• **Management team issues.** Teams that have a proven track record of operating successfully together are a much better risk for success than groups of people that have no experience working together. Does your company have such a team?

• **Critical risk factors.** The most attractive venture will have no critical risk factors. Even one or two critical risk factors, such as the following, can render an opportunity unattractive:

Risk/return issues. If you make an investment of your time and money in this venture, what can you expect the return to be? Are the personal risks and returns worth the effort?

Desirability. This is the single most important factor in the whole opportunity screening process. How desirable is this opportunity to you? You are the only one who can decide.

Get a plan

Once you've decided on a venture, it is necessary to set forth your goals and objectives for the business. If you are the sole entrepreneur in the venture, the goals of the business will correlate to your own personal goals.

If a formal team is involved, it makes sense to involve them in the goal-setting process: The more people you have involved in the business planning, the more people will feel as if they have a vested interest in helping determine the direction and outcome of the business.

Even if you, as the lead entrepreneur, ultimately decide the course of the business, involving people can help you confirm or dispel notions about the path you have chosen.

Once the goals and objectives are set for the business, it is wise to state those strategic and tactical goals in a written business plan. This is the document you should use to run your business. To be effective, you want the plan be dynamic so that you can change the document to preserve its usefulness as the need arises. This type of plan is called an "operational business plan," because it sets forth how the business will run and is written more

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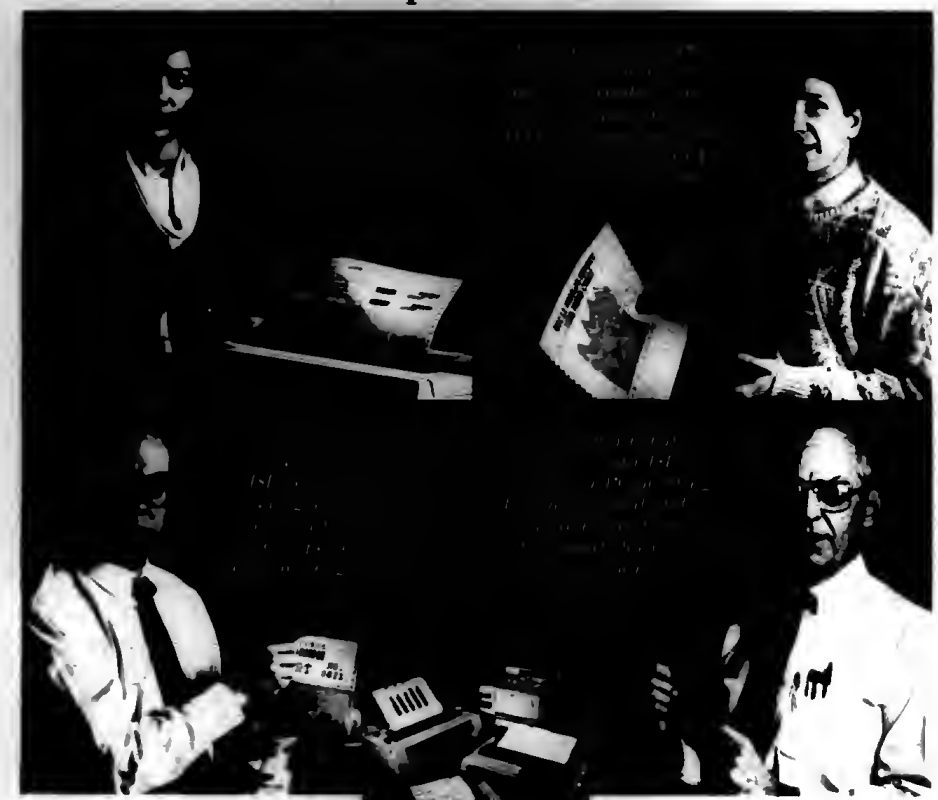

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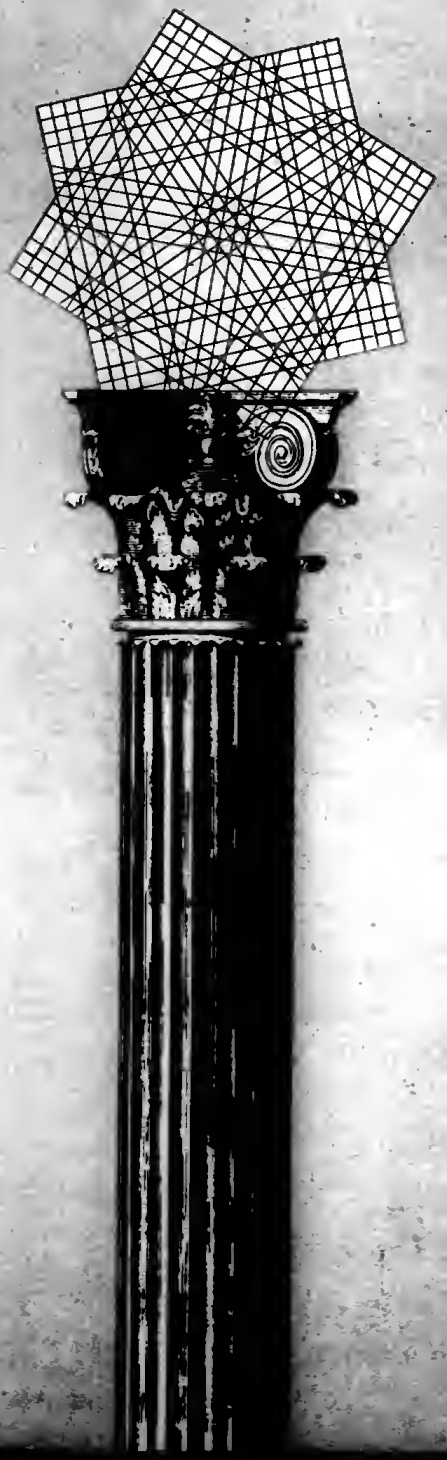

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as a guide for the management team.

Another type of business plan is a "marketing business plan," which may include many of the elements of a traditional operational business plan but is written to target an investment group that might finance the business. This type of plan contains more adjectives than an operational business plan.

Any business plan should include sections on marketing, operations, finance and the management team. A general rule of thumb for a marketing business plan is to be concise but still substantiate all thoughts. Investors need enough information to make a decision on the business but should not be inundated with superfluous data.

One way to start putting together a business plan is to assess the scope of the opportunity. Market research is probably the most valuable tool that you have at your disposal to help you understand the market and, in turn, its potential.

Market research is done to gather information about the market. There are two types of market research: primary and secondary.

Secondary research, the less expensive type, is research that has been collected by another source. The value of secondary research is that it is inexpensive and quickly acquired (once you find it). The problem with secondary research is that it is not necessarily exactly what you want.

An example of secondary market research is U.S. Census information. While the census might tell you how many men and women live in Delaware, it will not tell you how many of those people like vanilla ice cream with chocolate sprinkles on top.

To find out how many people like vanilla ice cream with chocolate sprinkles, you must perform primary research. Primary research is the process of going to the subjects from whom you want information and asking them directly about the data you are trying to acquire. Primary market research can be conducted through a host of vehicles, including mail questionnaires, in-person surveys, in-person interviews and telephone interviews.

The technique you use depends on the type of information you are attempting to gather as well as the type of audience surveyed.

A key point in doing market research is to first establish the goals and objectives of the research. The more well defined these goals and objectives are, the more accurate the information will be.

The Four P's

Market research can be used to help determine many of the attributes you need for developing a marketing strategy. Market research can help you determine market size, competitive information, pricing strategies and definition of products or services, and it can also help you pinpoint presentation vehicles. Essentially, market research can help you determine what are commonly referred to as the "Four P's" of marketing: product, place, price and promotion.

- **Product.** If you are creating a new product, you need to ensure market demand. Market research can serve as a barometer of what the new product demand will be.

For example, when Xerox Corp. initially created the photocopying machine, a consulting firm attempted to forecast demand for the photocopying technology by looking at a comparable process — the use of carbon paper. The firm forecast market demand by looking at the total number and growth in use of carbon paper over a certain time frame. The firm supposed that this photocopying would gain only a portion of the current carbon paper market.

ANY BUSINESS plan should include sections on marketing, operations, finance and the management team. A general rule of thumb for a marketing business plan is to be concise but still substantiate all thoughts.

Had it asked the market what it thought of the product, the company would have realized that the technology actually created a new demand that caused the market to grow enormously. Market research also could have helped determine product attributes that existed or should have been created for the photocopier.

- **Place.** Place refers to the distribution channels that are used to sell the product. Choice of the distribution channel aids or chokes the marketing strategy.

For example, if you decide to sell your product yourself and also have resellers sell it, you are actually impeding the sales process by underpricing or competing with your resellers. Do not set up channel conflicts, and remember that there are trade-offs between gross profit margins and quantity of sales, depending on the distribution channels you choose.

- **Price.** Price is another variable in the marketing mix. Pricing can stimulate or stifle market demand for a product. The now-defunct Apple Computer, Inc. Lisa is an example of pricing a product beyond the price sensitivity of the market. The Apple Macintosh was priced more in line with acceptable pricing standards of the market.
- **Promotion.** Promotion is the final component of the marketing strategy.

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your product: trade advertising, direct mail, television, radio, public relations? The vehicles you choose should be compatible with the target market you are trying to reach. For example, you wouldn't advertise consulting services in *People* magazine.

The product, distribution channels and price will all factor into your promotion decision. In fact, product, place, price and promotion all have an effect on one another.

Putting a team together

Now that you know how your product will get to market, which team will get it there? Two things should be remembered when putting together a team: skill and trust. Make sure you define the skills you need in the business and fill distinct jobs with people who have the competence to perform those functions.

In the early phases of a business, when resources are particularly scarce, people may perform more functions than normal. If this is the case, ensure that you prepare your employees so that they will either grow with the company (as their functional jobs may become more defined) or understand that their responsibility may be forced to change but not necessarily correlate with the growth of the company.

TWO THINGS should be remembered when putting together a team: skill and trust. Make sure you define the skills you need in the business and fill distinct jobs with people who have the competence to perform those functions.

Along with this growth, the last thing you want to have to worry about is trusting an employee. Trust is relevant in two regards: competent job performance and integrity.

Judgment prevails when creating a team. Teams are always suboptimal. Maximizing the way a team functions and grows takes a skilled individual — make sure you have that person.

You now know you have a product the market wants, the marketing strategy is in place and your team is raring to go. The next question is, "How can we most successfully make money from this venture?" Now is the time to figure out everything you need to do in the business from a marketing, operational and financial perspective.

When all is determined, put together your profit-and-loss and cash-flow statements, balance sheet and break-even analysis. Do you make money? How much? After how long? How much capital is required to start or buy the business? What are the sources and uses of this capital? If you cast all of these statements and you see that the numbers aren't to your liking, begin toying with various elements of the business to increase or decrease revenue or expenses. Play with the structure of the business. When everything is fine-tuned, you have a business.

Once your plan is together, you need to find out how you will finance the business. Financing sources can come in the form of debt or equity. Debt, an obligation to repay the money, might come from your relatives, a bank or the public markets. Equity financing, a pure investment in the company, might come from such sources as "angels" (generous, wealthy individuals), venture capitalists or the public markets. Your source of investment will be determined by the type of business you are running, market conditions and the size of the needed investment.

Heading out on your own these days takes even more courage and planning than ever before — especially for IS personnel for whom issues such as business planning and venture capital might be foreign languages.

However, with a clear understanding of the Four P's, technical managers can still make the leap from corporate grind to the fulfillments of entrepreneurial life. •

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NATIONAL BRIEFS

Deep Poqet

When laptop start-up **Poqet Computer Corp.** hit a familiar entrepreneurial snag — more demand than the 2-year-old vendor could supply — it didn't have to go far for friendly aid. Strategic ally and approximately 38% investor **Fujitsu, Ltd.** will step in as supplementary manufacturer, producing the Poqet PC in Japan.

3Com's 3Q

Local-area network player **3Com Corp.** announced third-quarter net income of $6.7 million, a 34% drop from the $10.7 million reported in the comparable 1989 quarter. Quarterly sales remained virtually unchanged, settling at $107.3 million, compared with sales of $107.1 million a year ago.

New roommates

National Semiconductor Corp. last week reorganized to make room for an expanded vice-presidency and a North American business center. Sharing the enlarged office of the vice-president for worldwide marketing and sales with current VP Donald Beadle will be company veteran Patrick Brockett, also named to head the new business center.

Aging Apple grasps for glory days

Erstwhile upstart faces midlife crisis of layoffs, management strife and flat growth

ANALYSIS

BY JAMES DALY
CW STAFF

Pudgy yet still puppy-eyed, Paul McCartney has been making the rounds of U.S. arenas and stadiums, including a scheduled stop last night in Berkeley, Calif., desperately trying to squeeze into the cloth of former Beatle glory days.

Down the long and winding road in Cupertino at Apple Computer, Inc., workers are tackling the same task that has bedeviled McCartney — re-establishing the credibility of an act that once seemed bulletproof.

Apple is struggling to retain the effervescence of its first rush of celebrity. But 14 years after its start and a decade after rewriting the rules in the personal computer business, the fizz is gone.

Today, Apple's upper management is in turmoil, hundreds of workers have been laid off, growth has flattened and the direction of its popular Macintosh line is being lambasted by customers and distributors alike.

The reason, some observers say, is that a vital ingredient is gone. Since its inception, Apple has been run by intense personalities who in many ways have come to personify the company. Steve Jobs, for example, the brash co-founder driven to produce "insanely great" machines, and departing Apple Products head Jean-Louis Gassee — an outspoken man known for crafting sexual metaphors out of technological advances — symbolized the mad-dog creativity at Apple as much as any new product. What passed at other firms

Continued on page 100

Photos courtesy of Apple Computer, Inc. CW chart: Joe Lertola

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"So, Horvath, what you're saying is graphical word processing is imperative to the future of this corporation. Well?"

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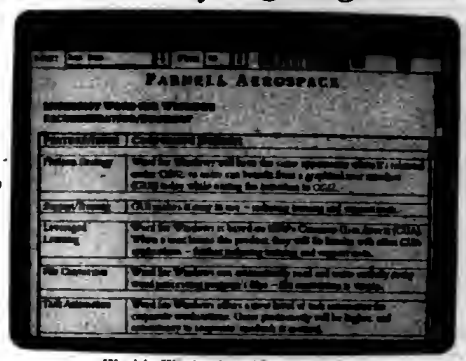
HORVATH: Well, Mr. Parnell... I think now's the time to make the change...
PITZER: Sure, that's what Cundy said about our database program two years ago. And we *all* know what happened to...
PARNELL: Pitzer, let Horvath finish.
HORVATH: Based on my comprehensive evaluation, I'm convinced that Word for Windows is the answer.
PARNELL: Word for *who?*
HORVATH: Windows, from Microsoft.
HAMILTON: Frankly, Ivan, I don't see why we have to change at all.
HORVATH: You're missing the point. Graphical computing will soon be the standard. If we adopt the Windows platform now, all of our users benefit. Heavy users would spend hours on projects instead of days. And light users, minutes instead of hours. The way it stands, we're throwing away a whole lot of money. Not to mention productivity.



Word for Windows' graphical user interface benefits people who've never even seen a boardroom. As well as those who frequent it.

HAMILTON: But what about that OS/2 business everyone's been talking about?
HORVATH: What about it?... The interface will be virtually the same on Windows and Presentation Manager.
FIDLER: C'mon Horvath... that's a little hard to believe.
HORVATH: Not really... you see, Word for Windows is based on IBM's Common User Access. Once our users learn it, they'll be well on their way to understanding other applications that support CUA.
FIDLER: That's all *very* nice, Ivan, but let's go beyond long-term benefits...
HORVATH: Okay, Fidler. Consider how long it takes to develop a standard contract...
FIDLER: Yeah, what about it?
HORVATH: Using Word for Windows would eliminate the problem. Its Document Template feature can prompt users to input necessary data... So even our paralegals could write contracts.
DELMAN: Just a minute, Mr. Parnell, who's gonna provide the training?... It may be my job, but I haven't got time for it!
HORVATH: Relax, Delman... Word for Windows has computer-based training and context-sensitive, on-line help. So it's virtually foolproof... users can train themselves. Which means our training and support costs would be reduced and the corporation saves money.
COHEN: But what about the equity we have in our current system? Are you suggesting we trash it?
HORVATH: Not at all... Word for Windows has complete file conversion facilities...
COHEN: Complete?... *How* complete?
HORVATH: It'll read *and* write to virtually every word processing program.
PARNELL: So let me get this straight, Ivan... you're saying that Word for Windows is easier to use and allows people to do more things?
HORVATH: Precisely.
PARNELL: Which could only improve our productivity...
HORVATH: I rest my case, Mr. Parnell.
PARNELL: Most impressive, Ivan. But before I make my decision, I'd like to hear what Cameron thinks. Cameron?... *Cameron?*
LUCERO: Psssst... *Hey, Cameron, wake up!*

The preceding scenario has been a dramatization. The benefits of Word for Windows, however, are a reality. For further proof of its capabilities, simply call us for a free brochure. Or order our fully-functional Working Model for just $9.95.* The number is (800) 541-1261, ask for the folks in Dept. K56.

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Xerox loses the first skirmish to Apple

BY JAMES DALY
CW STAFF

SAN FRANCISCO — A federal judge has emasculated Xerox Corp.'s $150 million claim disputing Apple Computer, Inc.'s title to the distinctive graphical user interface found on its Lisa and Macintosh personal computer lines.

U.S. District Judge Vaughn Walker last week dismissed five of six counts of the suit Xerox filed in December, including allegations that Apple's copyrights were invalid and that it had engaged in unfair competition. Xerox attorneys said they will appeal the ruling.

Xerox sought to have Apple's copyrights canceled on grounds that they emanated from work Xerox had done on the so-called Star project at its Palo Alto Research Center in the 1970s. Xerox, however, failed to exploit any of these innovations commercially, and the windows-and-icons graphics display later became wildly popular on Apple products.

Observers expected Stamford, Conn.-based Xerox to face an uphill battle because the suit was filed so long after the 1984 introduction of the Macintosh; furthermore, the suit did not allege that any Apple products violate Xerox copyrights. Instead, Xerox claimed the copyrights were fraudulently obtained because they did not mention that the Apple designs were based on Xerox's work.

According to its complaint, Xerox has been denied monetary benefits from the technology because Cupertino, Calif.-based Apple "is claiming ownership and copyright to much of the subject matter Xerox actually owns and desires to license." Xerox attorneys claimed companies were hesitant to pay a licensing fee to Xerox because they feared an Apple suit.

Walker observed that such allegations, if true, would be more properly brought by the affected companies, not Xerox.

The judge also threw out Xerox's contention that Apple had wrongfully received at least $100 million and caused at least $50 million in damages to Xerox's business. In addition, he denied the company's request for an order canceling Apple's federal copyright registration for the interface.

The only count remaining is Xerox's assertion that it is the sole owner of the Star software copyright — a claim Apple does not dispute. The count also alleges that Apple has inhibited Xerox from entering into licenses with other companies. Walker allowed Xerox 30 days to present witnesses and evidence to support this claim.

The legal battle of which this suit is just one skirmish began when Apple sued both Hewlett-Packard Co. and Microsoft Corp. on charges that they had misappropriated Apple's graphical user interface software. Xerox chimed in that it was the true pioneer of the technology and began demanding licensing fees. When only two companies came forward to pay the fees, Xerox took Apple to court.

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INTERNATIONAL BRIEFS

ScandinAviion

Premier Norwegian computer company **Norsk Data** has become the first major European firm to sign on to resell **Data General Corp.'s** reduced instruction set computing-based Aviion product line. The agreement was inked last week and is valued at $6 million during 1990.

The case of the flive five

Months of investigation coupled with no end of frustration with asking nicely drove **Apple Computer, Inc.** into court in Taiwan last week to ask for criminal sanctions against five individuals allegedly infringing Apple's copyright and trademark rights under Taiwanese law. Police and members of the prosecutor's office in the capital city of Taipei staged a raid on Taipei-based Flive Computer Corp. after the complaint was filed.

Buy British

Ontario-based Geac Computer Corp. Ltd., a $75 million purveyor of hardware and software to the worldwide financial services market, last week acquired its way into another of the vertical markets it has declared itself poised to pursue. With the purchase of the RF400 Factoring & Invoice Discounting software line from UK-based **Globex**, Geac got an IBM Application System/400-based system with which to further its reach into the 14 countries it serves.

Phoenix targeted for takeover

Norwood eyes firm, CEO Fisher's protestations notwithstanding

BY MAURA J. HARRINGTON
CW STAFF

NORWOOD, Mass. — "The company is not for sale ... We're not even a good takeover target," Ronald Fisher, president and chief executive officer of software vendor Phoenix Technologies Ltd., recently said.

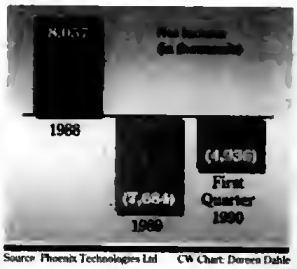
Little did Fisher know that only days later, Phoenix would be targeted in a hostile takeover attempt led by by Norwood Partners Limited Partnership.

Norwood is a private investment partnership consisting of stockholders in Phoenix Technologies. Through a corporation established expressly to buy Phoenix, it has offered fellow shareholders $5 per share for Phoenix stock currently trading in the $3.25-neighborhood.

Norwood Partners's tender offer "is in the best interests of all the shareholders," said Daniel Barnett, general partner of Norwood Partners. Phoenix's new operating plan, under the direction of Fisher, "has not proven as effective as hoped for" by the shareholders, said Barnett, one of the major forces behind the takeover bid.

Catch me now — I'm falling

A takeover may be the only salvation from Phoenix's time of financial torment. Losses in first quarter 1990 already tally over 60% of the losses for all of 1989.



Source: Phoenix Technologies Ltd. CW Chart: Doreen Dable

According to Phoenix senior marketing director George Adams, the board of directors viewed the offer as "illusory" and said Phoenix has "programs under way that it believes will be in the best long-term interests of the stockholders." The board also advised stockholders in a formal statement that "any discussions with Norwood would not be in the best interests of the company or of its stockholders."

Norwood also asked the Phoenix board to cancel its "poison pill" shareholder rights plan and to allow a due diligence search to go forward. So far, Adams said, the board is not so inclined.

If Norwood does take over Phoenix, it plans to take the company private, Barnett said.

Barnett added that in the past Norwood has hired consultant Robert Angelo, Phoenix's former vice-president of OEM operations, who was reportedly forced out of the company because his views of its then-future direction differed from those of several highly-placed colleagues, according to a source close to the company.

The source speculated that Angelo, whom he said knew the direction of the company, could be playing an invisible role in the takeover bid.

However, a Wall Street analyst who asked not to be identified speculated that David Parkinson, Phoenix's chief financial officer, who has already announced his imminent departure, is in fact spearheading the takeover attempt.

According to Fisher, it doesn't matter who is attempting the takeover or how they plan to proceed. Why? Because the board and the company's senior management control between 52% and 55% of Phoenix's stock, he said.

"Yes, it's true. We can't do anything without their approval," said Barnett, "but if I were a shareholder — and I am — I would want the board of directors to act in my best interest."

Phoenix's Fisher *spoke too soon*

Norwood Partners currently owns 8.3% of Phoenix's stock, Barnett said.

"This year we're undergoing an enormous transition, and we'll continue to do that," Fisher said, adding that the company's revenue recognition structure has changed, and the company has consolidated its offices, cut back its work force and gotten rid of all the overhead.

Other management problems, Fisher said, were that the company expanded too fast and undertook projects that it couldn't complete. For example, a failed Sun Microsystems, Inc. clone workstation project had to be dropped because the company could not get it together, Fisher said.

With approximately $16.8 million in net income lost in the past five quarters and an estimated $4.9 million net loss expected to be posted for the second quarter 1990, however, Phoenix will not be able to dig itself out of debt until at least the fourth quarter, Fisher said.

The new strategy, Fisher added, is for Phoenix to focus on its three main product areas: the flagship ROM BIOS product line; the Phoenixpage, the company's line of printer language interpreters; and its OpenPC workstation line.

"We will be making a number of announcements in the next two months, mostly additions to our present product lines," he said.

While Fisher is reportedly convinced that he can pick the company up and put it back on its feet, the anonymous source said, "I don't think [the board of directors] has a clear understanding of what to do with the company."

The source added that Phoenix needs to work on producing a blockbuster product.

Wang after An Wang: Where is it headed?

ANALYSIS

BY NELL MARGOLIS
CW STAFF

LOWELL, Mass. — As many of the multitudes who memorialized the founder and chairman of Wang Laboratories, Inc. last week pointed out, the name An Wang means "Peaceful King."

The name Richard Miller means "Miller the Powerful Ruler."

Whether the contrast proves prophetic or merely an amusing piece of trivia is likely to be one of the key points on which computer industry eyes focus in the months to come as the company continues its struggle to regain a foothold in the territory it once helped to create.

Last Wednesday, however, it leaned toward prophecy as the Wang board of directors unanimously handed Miller — president and chief operating officer since last August — the titles of chairman and chief executive officer. The election made the former General Electric Corp. executive the only person other than the late founder to hold the full suite of executive titles at Wang.

The triple crown does not come without its thorns; in the very statement in which he declared himself "pleased and humbled" by the board's and the Wang family's support, Miller also noted that third-quarter losses at Wang, exacerbated by flagging demand and pressured margins, will probably exceed analysts' predictions.

Another pressing question on the minds of Wang users, stockholders and particularly employees was whether Miller's assiduous campaign to rebuild Wang is aimed at repositioning the firm as an independent entry or shaping it into a maximally attractive acquisition candidate. Despite repeated protests to the contrary, many analysts believe the latter is likely.

The questions of where Wang is headed, how likely it is to get there, and with what effect on whom have been in constant play since last summer, when mounting debt, management chaos, huge quarterly losses and too long a stint without an innovative and successful product debut led to the ouster of then-President Frederick Wang and the ascent of Miller. An Wang's death, however, recasts all such questions in the light of a new set of speculations: To what extent was Wang the firm dependent on Wang the founder? And to what extent will the Wang family continue to influence the course of a company that has always been a family business?

When it comes to control, the picture of Wang after An Wang is likely to look much like the picture before. Wang's common stock is divided into two classes, B and C: the latter has full voting rights. Class C stock elects nine of the company's 12 directors.

Wang's Miller *is now chairman and CEO*

As of last fall, individual members of the immediate Wang family and a family trust owned more than 80% of the Class C stock; since then, family members have added to their Class C stockholdings in unspecified amounts, the company confirmed.

The provisions of An Wang's estate are not yet known. With trusts in the scenario, the precise terms will remain confidential. However, sources close to the family and to the company said last week that it was overwhelmingly likely that his stock would remain in family hands.

As for influence, the once and future controlling stockholders left no doubt as to where they stand. "We support Rick Miller and the other members of the Wang management team in their efforts to build a strong and growing company," said Frederick Wang, speaking for the family group in a prepared statement. Later that week An Wang's widow, Lorraine Wang, was named honorary chairwoman.

In its statement, the family indicated that the firm is not for sale. "[We] believe that the long-term plan now being implemented to return the company to profitability will achieve its objectives and that the implementation of the plan remains the best means through which to maximize stockholders' value in the company," they said.

Independence uncertain

The statement was received in some quarters as the controlling owners' definitive resolution to resist acquisition; indeed, continued family control of Wang Class C stock would effectively bar any hostile takeover.

Nevertheless, several analysts questioned the continued viability of Wang as an independent company.

"I think now what I've thought since Miller was first brought on board: that his goal is to gussy up the company, get it profitable, and sell it," said one Wall Street analyst close to the company, who wished to remain anonymous. This, the source said, would be desirable and could be inevitable. Independent status in a rapidly consolidating industry, the source added, requires size, strength and credibility — all of which have drained out of Wang in recent months, and even years.

Moreover, analysts noted, nothing in last week's family statement precludes a friendly acquisition some months down the line.

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Apple

CONTINUED FROM PAGE 93

for sizzle was part of the steak at Apple.

When Gassee leaves in September, following Apple veteran executive Delbert Yocam out the door, one of the last of the legendary Apple corps will he gone. The vacuum underlines a problem that analysts say is increasingly evident: Apple doesn't know where it is headed. "Apple is like a teenager who has to sit down and say, 'What do I want to he when I grow up?' " said Norman Weizer, an analyst at Arthur D. Little, Inc., in Cambridge, Mass. "Cute won't work anymore."

Observers say the personality crisis began when John Sculley joined as president in 1983 and was charged with polishing Apple's image from one of a brash upstart into that of a corporate competitor. But that's a tough task for any manager. "It's possible to change a company's culture, but there is always a lot of breakage," said Lewis Leeburg, Information Systems Research Program director at UCLA's Anderson Graduate School of Management.

While Sculley professed a desire to maintain Apple's entrepreneurial spirit, some found his in-house changes wrenching. The ground-breaking Macintosh, for instance, was followed by upgrades that delivered more power — not more innovation. "Apple became a boring bureaucracy," said Andy Hetzfeld, a member of the original Macintosh design team who left the company two years ago. "Any time a committee decides things, projects are optimized to minimize the chance of failure rather than maximize the magnitude of success."

Some say the transition was inevitable once Apple was no longer an outsider. However, questionable moves were also made. The long-anticipated Macintosh portable came in a disappointment. At 17 pounds and $8,000, it's more than twice the price and weight of more powerful IBM PC-compatible laptops.

Allen Loren, brought in as head of Apple USA, left after a brief tenure, toppled by weak U.S. sales. Sculley cut the staff by 400 with one hand soon after inking million-dollar signing bonuses — for instance, a $1.5 million contract for Chief Financial Officer Joe Graziano — with the other. Several dozen of the cuts came from the customer support division — at a time when Apple users are increasingly vocal about their distaste for the company's spotty support services.

The company that used the cult of personality as a cornerstone for success suddenly seemed void of someone who could set the tone and symbolize the new Apple. In the spiritual vacuum, heads have turned to newly appointed Chief Executive Officer Michael Spindler. Friends describe the 47-year-old West German as an affable man who can tackle tough tasks. In two years, he nearly tripled Apple's European sales to $1.2 billion.

Similar domestic results could make a hero of Spindler, "Technologic Newsletter" editor Richard Shaffer said. Getting them is not likely to be easy. Sales growth is expected to slow from 30% this year to 10% next year, partly the result of a strategy that emphasized the high end while ignoring an overpriced low end.

Spindler, however, said the myth of the Apple god is antiquated. "This company has no room for prima donnas anymore," he said at the introduction of the Macintosh IIFX a few weeks back.

However, the transition to a faceless corporate giant without a personality to rally behind represents a fundamental shift for Apple and could present a ticklish marketing task. Apple grew tremendously by producing "the computer for the rest of us."

"The happy computer face that appears when you turn the Macintosh on is not a gratuitous gesture," said Chris Espinosa, a longtime Apple employee.

Love affair

The tactic has worked in spades. Apple users are perhaps rivaled only by Harley-Davidson riders in their unabashed love affair with the company and its products.

But already some of the features that brought the Mac recognition have disappeared. Microsoft Corp.'s Windows and IBM's Presentation Manager both borrow heavily from Apple's easy-to-use graphical interface. A new version of Windows scheduled for release this month promises even closer similarities.

The computer industry is certainly not devoid of the carcasses of firms that let a slowed-down large-corporation approach to technology tarnish a sparkling reputation for creativity.

In the early 1970s, Data General Corp.'s reputation for innovativeness brought the firm fame as the subject of Tracy Kidder's best-seller, *The Soul of a New Machine*. While still a multibillion-dollar company, DG has been plagued by a series of departures of young entrepreneurs who credit the firm's "mediocrity and ambivalence" as reasons for their departure.

Ultimately, Spindler, even the likes of Sculley and Corporate Development head Al Eisenstat may have little control over the situation. Star-quality personalities aren't made in a lab, and eventually it may make little difference if the CEO is wearing a pinstriped suit or a feather headdress. "It's the product that makes the difference," Shaffer said. "People don't buy a Mac because of Jean-Louis Gassee; they buy it because it's a good computer."

But questions linger. Will the public let Apple grow beyond its freshman reputation? Or will it he trapped like McCartney, able to expand but never able to escape from performing its greatest hits?

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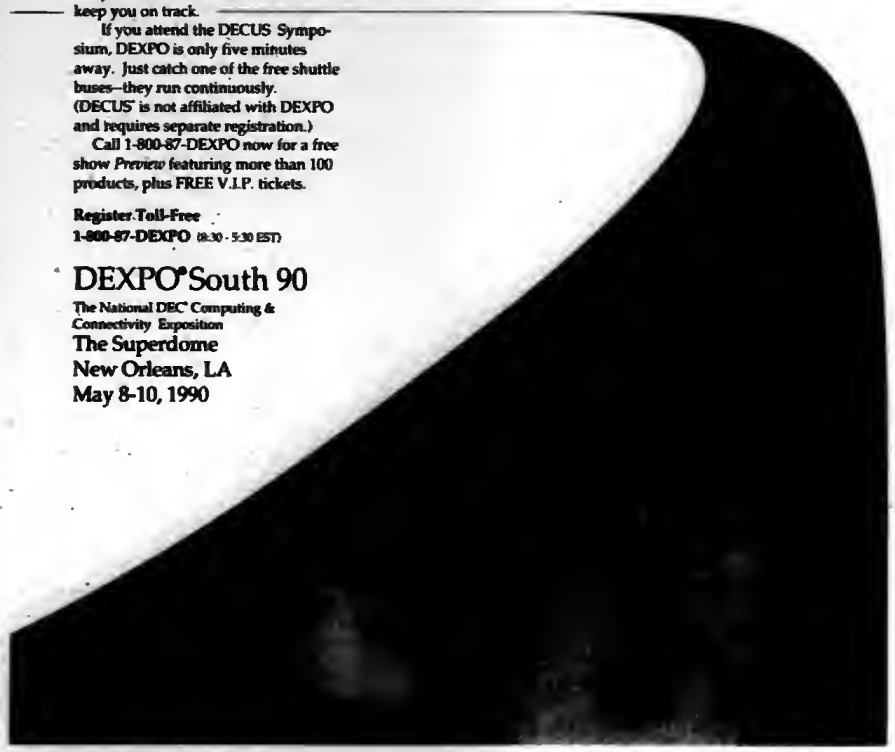

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— Max Steiner
Director of Marketing
Kenda Systems, Inc.

Max Steiner remembers his days as a salesman, when he would make calls and, invariably, see a copy of *Computerworld* on the desks of his clients. That alone made an impression on Max.

Today, he is Director of Marketing for Kenda Systems, a software services firm with offices in New England, New York and Washington, DC, and specializing in placing contract engineers within the high-tech industry. Having grown by 400 percent annually for the last three years — and having placed several hundred professionals in less than three years, Kenda Systems is an acknowledged leader in the industry.

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BY WILLIAM BRANDEL
SPECIAL TO CW

The American automotive industry, once a prize jewel in the U.S. industrial crown, has lost a lot of luster. The most sobering development for the industry is that it is no longer completely American. While the Big Three were closing factory doors in recent years, Japanese companies continued to build and expand U.S. plants.

For the information systems professional, opportunities in the industry might arise among these "transplants" as often as the Big Three, particularly with the industry mired in a sales slump, as it is now. Two transplants, one owned by Honda and the other a joint venture between the makers of Suburu and Isuzu cars, opened just last year and have yet to reach full production. Nissan, meanwhile, is nearly doubling the capacity of its 7-year-old factory in Tennessee.

There's a general reluctance to hire new people among the U.S. companies except for specific projects, and the situation extends to larger suppliers, says David Andrea, a senior research associate at the Office for the Study of Automotive Transportation at the University of Michigan in Ann Arbor.

Engineering service firms are "picking off" less critical computer-aided design work from U.S. auto makers, he adds.

IS professionals who land a position at one of the Japanese companies will encounter some management techniques foreign to traditional U.S. manufacturers. Take *wa*, for example. Rooted in the Japanese affinity for harmony, it is the principle that an organization gets more done through teamwork.

A job candidate can encounter *wa* before he lands a position. The Japanese companies are known for careful scrutiny of applicants. In screening them, the companies look at such things as attendance in past positions and attitudes toward teamwork as much as technical skill.

"We look for a person with a team-oriented approach," says Dan Scott, director of IS at Mazda Motor Co. in Flat Rock, Mich. The individual should be considerate of co-workers and focused on reaching goals. Then Mazda looks at "hard skills," such as experience with a specific database or programming language.

The notion of teamwork is put to use in the hiring process: At both Mazda and Diamond Star Motors, a joint venture between Mitsubishi Corp. and Chrysler Corp. located in Normal, Ill., job candidates are interviewed by a team of IS employees.

At Diamond Star, at least two prospective peers — senior members of the technical staff — interview job candidates after they have been screened by a manager. "It's a very important how comfortable all of us are with someone," says Rex Schemerhorn, the company's manager of IS operations. "*Wa* is part of the evaluation."

When he interviews candidates, Schemerhorn weighs their openness and responsiveness to questions. He asks about their past work relationships — how, for example, a technical support person got along with application developers.

Wa is also evident in the uniform that Diamond Star gives each employee — a jacket bearing the worker's name and the company logo. Everyone, from vice-presidents to people on the manufacturing line, wear them. "We don't differentiate ourselves from anyone else," Schemerhorn says. "This is very important."

Fostering *wa* is one reason Diamond Star and other Japanese companies encourage employees to exercise together at the start of the day.

There's also the notion of *kaizen*, or improving the process, which underlies the emphasis Japanese companies place on the quality of products. "We have team groups on the floor always assessing how we can improve the product together," Schemerhorn says.

Adjusting to Japanese management is easy for people who already have a team mentality, Scott says. However, many Americans are imbued with the individualist ethic, he adds.

Schemerhorn sees a blending of U.S. and Japanese culture. "Down the road, some of the things like the exercising may go away," he says. "However, the influence of these activities will always be here."

Meanwhile, U.S. auto makers will adopt more of the Japanese ideas, such as fostering greater teamwork among labor and management and between such functions as engineering and manufacturing, Andrea says.

"The only way to do that is to use information systems to integrate the various activities," he says. "The IS people have a great opportunity to play that integration role."

As they try to get close to customers, the U.S. companies will need to gather more marketing information and do more sophisticated competitive analysis, Andrea says.

In the manufacturing arena, they'll need to improve communications with suppliers and develop better information for production scheduling.

Many of these developments will await a pickup in business, however. "When the industry goes into downturn, those programs that are supposed to make you competitive get cut first," Andrea says. "Unfortunately, we're still driven by 10-day sales numbers."

Brandel is a free-lance writer based in Boston.

And then there were 10

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Mazda	Flat Rock, Mich.	1987	3,500
Toyota	Georgetown, Ky.	1988	3,500
Diamond Star[2]	Normal, Ill.	1988	2,900
Subaru-Isuzu	Lafayette, Ind.	1989	1,700
Honda	East Liberty, Ohio	1989	350

1 Toyota/General Motors 2 Mitsubishi/Chrysler

Source: Japan Automobile Manufacturers Association (1989) CW Chart: Doreen Dahle

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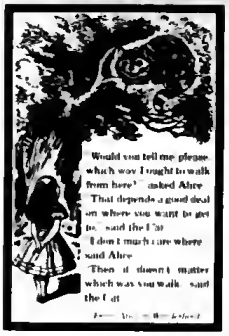

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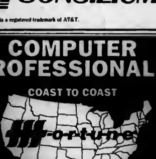

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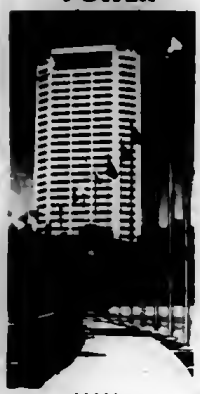

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MARKETPLACE

Pick a tool that's right for you

The choice of a code generator or CASE product raises a host of questions

BY JESSICA KEYES
SPECIAL TO CW

Computer-aided software engineering (CASE) tools come in many flavors, but choosing one is much more than a matter of taste.

The first ingredient you should consider is the degree of software engineering you want your tool to perform.

On the low end of the totem pole are the basic personal computer-based code generators. These tools typically cost about $300. With flowcharting and screen-painting, the user graphically depicts the input, output and processes of the program he wants to build. After a compile, the system spits out finished source code, typically in C.

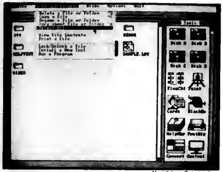
These tools are not only for end users. Professional information systems people use them to quickly generate simple PC-based applications, with a significant gain in productivity.

In selecting the proper code generator, one needs to ask several questions. First, to whom is this product geared? If it's an end user, the tool selected should be easy to use and icon-driven.

If the code generator is to be used by IS people, it is more critical to assess its robustness: Is the language compatible with the ones used in-house? Can the tool access external files in programs such as Ashton-Tate Corp.'s Dbase or Lotus Development Corp.'s 1-2-3? Can you exit the code generator to call a program that you have written?

As your applications get more complex, it becomes more apparent that a simple code generator won't do. Now you need that extra ingredient of CASE.

The vast array of CASE features command a much steeper price than code generators do, typically $7,000 to $120,000.



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Be aware that not all CASE tools handle all CASE functions. Generally, some do planning and others do development.

Again, there are several questions you should ask:

• **Does the tool provide a data dictionary?** If not, forego it. Tools with a data dictionary are best at sharing specifications among systems.

• **What kind of analytical capabilities does the tool offer?** Will it let you examine system models, view on-line screens and output reports?

• **Does the tool read pre-existing libraries and create specifications?** Don't forget your company has millions of dollars invested in systems created B.C. (Before CASE).

• **What kind of graphical capabilities does the tool have?** It's nice to be able to graphically depict a system's design. Of course, this feature needs to be thoroughly integrated with the data dictionary so the flowchart can display dictionary entries.

• **Can the tool interface to the database or file organizations that your company uses?** It makes no sense to buy a tool that doesn't have an interface to the database of choice.

• **How accurate is the code?** The accuracy should be benchmarked. Try using the CASE tool to specify a program that has already been written and compare the two versions.

• **Can the generated code access a prewritten program?** An example would be the ubiquitous calendar routine.

• **Can the tool do project management and word processing?** Granted, these are bells and whistles, but ones that foster greater productivity.

• **Can the CASE tool be tailored?** Your organization has its own rules for designing software. Can the tool's rules be overridden for them?

• **Can the CASE tool automatically generate operational and end-user documentation?** Need I say more?

• **Does the tool provide prototyping capability?** The tool should have the ability to generate systems that are partially completed but testable.

• **Can the tool "export" portions of the design or development dictionaries?** This capability has come to be known as "reusable design."

While only one-fourth of IS organizations use some kind of CASE tool, CASE will succeed. It provides developers with a workbench that not only increases productivity but creates more trouble-free systems. With this checklist as a guide, hopefully your selection of a CASE tool will be trouble-free as well.

Keyes is president of New Art, Inc., a management and computer consulting firm in New York.

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AT Model 239	$1,350	$1,700	$1,200
AT Model 339	$1,500	$1,800	$1,500
PS/2 Model 50	$1,850	$2,200	$1,700
PS/2 Model 60	$2,425	$2,600	$2,400
Compaq Portable II	$1,700	$1,725	$1,550
Portable III	$2,400	$2,500	$1,900
Portable 286	$1,700	$2,000	$1,700
Plus	$750	$950	$675
Deskpro	$900	$1,200	$900
Deskpro 286	$1,525	$1,825	$1,300
Deskpro 386/16	$2,500	$2,750	$2,475
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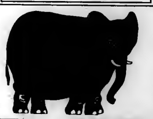

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Taking the pulse of IS training

Answering these questions can provide a measure of effectiveness

BY MARK DUNCAN
SPECIAL TO CW

Engineers, technicians and scientists have always been preoccupied with measurement. Information systems people are no less preoccupied: We seek metrics for software quality, productivity and reliability.

While some things are easy to quantify, others prove more elusive. Nevertheless, I would like to offer my own humble contribution to the world of metrics — one intended to measure the effectiveness of training. For want of a better name, I have christened it the "Duncan Metric." It consists of 10 questions.

At first brush, the questions call for a yes or no answer. Later, it may be a good idea to answer them on a comparative basis, perhaps on a scale of one to 10.

My 10 questions are not exhaustive, but they get the idea across. They are the following:

• **Do the organization and its IS department have formal training policies?** A formal policy lends credibility to training; without it, training managers may have to repeatedly justify spending, even for ongoing needs. The policy may be quite specific; it might, for example, state the amount of training required every year at various job levels.

• **Is there a formal mechanism through which staff members can request training?** There must be a formal mechanism to request training that people need for a project or for career development. The mechanism should be advertised, and the staff should be encouraged to use it. Ideally, staff members should be given a regular opportunity to express their needs, perhaps in a semiannual performance review.

• **Are training curricula published and circulated?** Without a starting point, most staff members will not plan their annual training. The trigger then becomes something sudden — growth in the number of software defects, for example.

• **Does the IS department conduct a needs analysis regularly — annually for instance?** IS is undergoing unprecedented technological change: Hardware, software and development tools are advancing at breakneck speed. Training remains viable only if it keeps pace with these changes, and the best way of verifying that it does so is through a regular needs analysis.

• **Are there proficiency levels for essential skills?** Identifying them should be easy in some cases, such as knowledge of a development tool, but more difficult for an abstract skill such as interviewing users to elicit requirements. The philosophy is that training is not a one-time activity; it is extended or repeated as often as necessary to achieve optimum proficiency.

• **Do students get a timely opportunity to apply their new knowledge and skills?** Lack of use of newly acquired skills invariably leads them to atrophy. Organizations shouldn't view training as finished with the completion of a course. The scope should encompass time to apply the new skills. The goal is to achieve fluency in tools and techniques by complementing theory with hands-on experience.

• **Does the IS department groom "internal" trainers?** Very often, organizations can recruit the best trainers from their existing staff. These people are often the most knowledgeable practitioners of the methods and tools in use. Internal trainers make good economic sense and provide another dimension for career development. It's important to be careful in selecting them, however, because good practitioners do not always possess teaching skills.

• **Is there a database of training vendors and criteria for selecting the best trainer for a given requirement?** If external trainers are used, exercise care in getting the best ones available. Identifying and then insisting on repeated use of the best vendors and instructors will minimize variations in quality, consistency, style and material. This process will also foster long-term relationships between trainer and client, leading to better mutual understanding and fulfillment of training needs.

• **Does the IS department complement technical training with an education in the company's business?** In IS, it is easy to focus on technical training alone. However, companies improve their performance when IS better understands the business units. Integration of IS with the business facilitates communication and creates alliances rather than rivalries.

• **Is there a skills inventory?** A training organization must maintain a skills inventory for all staff members. It is an essential element of needs analysis and curriculum development. An inventory provides quick identification of available and needed skills, helps identify internal trainers and allows verification of training direction.

Naturally, since it is brand new, there are no benchmarks or standards for the Duncan Metric. However, when one applies it, the general health of a training function will be obvious. I suggest that the metric be extended with other appropriate questions. I also would encourage repeated application to ensure continued improvement in training.

Duncan is a quality assurance consultant at a large Dallas bank.

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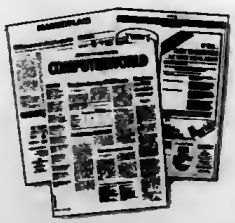

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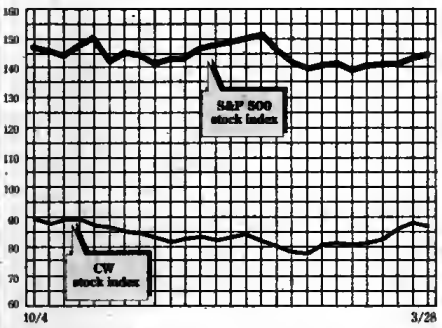
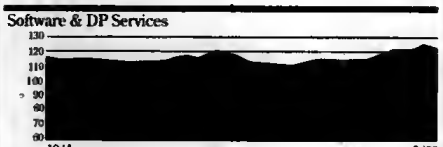
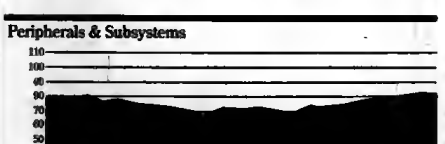


Indexes	Last Week	This Week
Communications	122.6	123.2
Computer Systems	81.8	81.9
Software & DP Services	125.9	123.1
Semiconductors	59.1	58.3
Peripherals & Subsystems	81.6	81.1
Leasing Companies	96.3	96.0
Composite Index	88.4	87.8
S&P 500 Index	143.4	144.3





Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, MARCH 28, 1990

E X C H		52-WEEK RANGE	PRICE CLOSE MARCH 28, 1990	WEEK NET CHNGE	WEEK PCT CHNGE
	Communications and Network Services				
N	AMERICAN INFO TECHS CORP	66 50	60.125	-0.1	-0.2
Q	ANDREW CORP	26 16	24.5	0.8	3.2
Q	ATTEL COMM CORP	10 3	6.375	-0.1	-1.5
N	AT&T	47 30	42.875	1.0	2.4
Q	AVANTEK INC	7 3	3	-0.3	-9.4
N	AYDIN CORP	21 14	15.625	0.8	3.3
N	BELL ATLANTIC CORP	114 78	93.5	2.8	3.2
N	BELLSOUTH CORP	66 41	54.875	1.0	1.8
Q	COMPRESSION LABS INC	16 4	14.125	0.1	0.6
Q	CONTEL CORP	37 25	28.625	1.0	3.6
Q	DATA SWITCH CORP	6 2	2.625	0.4	18.7
Q	DIGITAL COMM ASSOC	25 17	20.5	0.1	0.5
Q	DYNATECH CORP	21 18	18.25	0.8	4.8
Q	FIBRONICS INTNL INC	8 4	7.25	-0.1	-1.7
Q	GANDALF TECHNOLOGIES	7 3	3.75	0.1	4.2
N	GENERAL DATACOMM INDS	7 4	4.125	0.0	0.0
N	GTE CORP	72 45	64.8	1.8	2.8
Q	INFOTRON SYS CORP	13 5	5.25	-1.0	-16.0
N	ITT CORP	66 51	53.25	0.8	1.4
N	M A COM INC	6 4	4.25	0.0	0.0
Q	MCI COMMUNICATIONS CORP	49 27	37.375	2.9	7.9
N	NETWORK EQUIP TECH INC	34 20	29.75	-3.3	-9.8
Q	NETWORK SYS CORP	13 7	11	-0.8	-6.4
N	NORTHERN TELECOM LTD	28 14	25	-0.6	-2.4
Q	NOVELL INC	45 24	42.125	-0.3	-0.6
N	NYNEX CORP	92 70	81.625	0.8	0.8
N	PACIFIC TELESIS GROUP	52 34	46.375	0.0	1.8
A	PENRIL CORP	9 4	7.375	0.8	7.8
N	SCIENTIFIC-ATLANTA INC	25 14	22.5	-0.4	-1.8
N	SOUTHWESTERN BELL CORP	65 44	56.375	1.4	2.5
N	3 COM CORP	29 10	13	-0.8	-5.3
N	U S WEST INC	81 61	74.25	1.5	2.2
	Computer Systems				
Q	ALLIANT COMPUTER SYS	8 3	6.25	-0.8	-10.7
Q	ALPHA MICROSYSTEMS	6 4	3.75	-0.3	-11.8
Q	ALTOS COMPUTER SYS	6 6	5.875	0.3	4.4
A	AMDAHL CORP	23 11	16	0.4	3.8
Q	APPLE COMPUTER INC	50 32	41.25	-0.4	-0.8
N	BOLT BERANEK & NEWMAN	10 8	8.0	0.0	0.0
N	COMPAQ COMPUTER CORP	113 66	95.375	-4.9	-4.9
N	COMMODORE INTNL	20 7	8.375	-0.3	-2.8
N	CONTROL DATA CORP	24 16	20	1.5	8.1
N	CRAY RESH INC	68 31	48.625	1.5	3.2
Q	DAISY SYS CORP	6 3	0.563	0.1	12.8
N	DATA GEN CORP	16 6	9.125	0.0	0.0
N	DATAPOINT CORP	6 3	3.375	0.8	35.0
Q	DELL COMPUTER CORP	6 3	7.625	0.1	+1.0
N	DIGITAL EQUIP CORP	103 70	78.6	-2.4	-2.9
N	FLOATING POINT SYS INC	4 1	1.875	-0.1	-8.3
N	HARRIS CORP	40 28	34	0.8	2.3
N	HEWLETT PACKARD CO	58 40	48.625	0.1	0.3
N	HONEYWELL INC	92 65	88.125	-0.9	-1.0
N	IBM	119 93	105.875	-1.4	-1.8
Q	INFORMATION INTL INC	16 12	12.375	-0.4	-2.8
Q	IPL SYS INC	10 5	10	0.8	2.6
N	MAI BASIC FOUR INC	6 3	2.875	0.0	0.0
N	MATSUSHITA ELEC INDL LTD	166 123	137	14.0	11.4
Q	MENTOR GRAPHICS CORP	22 14	18.75	0.3	1.4
N	MSI INC	3 0	0.281	0.0	0.0
N	NCR CORP	72 53	69.875	0.6	0.9
Q	PYRAMID TECHNOLOGY	30 6	28.625	-1.1	-3.8
Q	SEQUENT COMP SYS INC	28 11	26.25	1.3	5.0
Q	SHAREBASE CORP	3 0	0.438	0.0	0.0
Q	SUN MICROSYSTEM INC	25 13	23.375	-1.5	-6.0
Q	SYMBOLICS INC	3 1	0.75	0.0	0.0
N	TANDEM COMPUTERS INC	30 16	28.125	-1.0	-3.4
N	TANDY CORP	49 32	33.25	-2.6	-7.0
N	ULTIMATE CORP	12 6	9.375	-0.8	-7.3
N	UNISYS CORP	28 12	15.125	-0.3	-1.9
A	WANG LABS INC	6 4	5.375	-0.1	-2.3
	Software & DP Services				
Q	AMERICAN MGMT SYS INC	17 11	13	0.5	4.0
Q	AMERICAN SOFTWARE INC	24 13	21.875	-1.1	-4.9
N	ANACOMP INC	6 3	3.125	-0.1	-3.8
Q	ANALYSTS INTL CORP	20 13	17	1.3	8.0
Q	ASHTON TATE	24 9	12.125	-1.8	-11.8
Q	ASK COMPUTER SYS INC	16 7	9.375	0.3	3.7
N	AUTO DATA PROCESSING	54 36	51.875	-1.8	-3.3
N	AUTODESK INC	50 29	47.5	-0.3	-0.6
N	BMC SOFTWARE INC	26 10	24.25	0.8	2.1
N	BUSINESSLAND INC	14 7	11.375	0.4	3.4
Q	COGNOS INC	8 4	8.75	-0.1	-2.1
N	COMPUTER ASSOC INTL INC	22 11	14	-0.6	-4.3
Q	COMPUTER HORIZONS CORP	11 7	8.25	-0.6	-7.0
N	COMPUTER SCIENCES CORP	66 44	45.75	-1.6	-3.9
N	COMPUTER TASK GROUP INC	15 6	10.625	-0.9	-7.8
Q	COMSHARE INC	44 28	41.5	-2.0	-4.6
Q	CORPORATE SOFTWARE	16 6	12.25	-0.4	-3.0
N	GENERAL MTRS (CLS E)	31 21	30.25	-0.3	-0.8
Q	HOGAN SYS INC	7 4	4.375	0.0	0.0
N	IMNET CORP	17 6	14.125	-0.8	-3.4
Q	INTELLICORP INC	7 3	6	0.0	0.0
Q	LEGENT CORP	32 31	29.25	-1.0	-3.4
Q	LOTUS DEV CORP	38 16	35.25	-0.5	-1.4
Q	MICROSOFT CORP	117 48	111	-2.3	-2.0
Q	NATIONAL DATA CORP	35 26	27.25	-4.3	-13.5
N	ON LINE SOFTWARE INTL INC	11 5	9.5	0.0	0.0
Q	ORACLE SYS CORP	28 14	17.5	-8.5	-32.7
N	PANSOPHIC SYS INC	19 12	17	-0.4	-2.2
Q	PHOENIX TECHNOLOGIES INC	18 3	3.125	0.0	0.0
Q	POLICY MGMT SYS CORP	30 22	34	-1.3	-3.5
Q	PROGRAMMING & SYS INC	22 16	18	0.8	4.6
Q	RELATIONAL TECH INC	18 8	9.25	0.4	4.2
N	REYNOLDS & REYNOLDS CO	34 16	16.375	-0.6	-3.1
Q	SAGE SOFTWARE INC	13 7	12.75	0.0	0.0
Q	SEI CORP	20 16	19.25	-0.3	-1.9
Q	SHARED MED SYS CORP	19 13	13.25	-0.4	-2.8
Q	SOFTWARE PUBG CORP	25 11	22	-1.8	-9.4
Q	SUNGARD DATA SYS INC	26 13	18	-0.3	-1.8
Q	SYSTEMATICS INC	42 20	42	1.3	3.1
N	SYSTEM CENTER INC	28 16	24	-0.4	-1.8
N	SYS. SOFT INC	25 13	27.25	-0.3	-0.8
Q	WORDSTAR	8 1	1.129	0.4	90.0
	Semiconductors				
N	ADV MICRO DEVICES INC	11 7	9.5	0.0	0.0
N	ANALOG DEVICES INC	12 7	8.125	-0.1	-1.5
Q	ANALOGIC CORP	11 8	9.375	0.0	0.0
Q	CHIPS & TECHNOLOGIES INC	28 14	18.75	-1.8	-8.0
Q	INTEL CORP	44 34	42.5	0.1	0.3
Q	MICRON TECHNOLOGY INC	28 7	12.625	0.1	1.0
N	MOTOROLA INC	70 40	67.125	-1.0	-1.8
Q	NATL SEMICONDUCTOR	8 6	8	-0.1	-1.8
N	TEXAS INSTRS INC	47 36	37.375	0.4	1.0
A	WESTERN DIGITAL CORP	16 8	12	-0.8	-5.9
	Peripherals				
Q	ALLOY COMP	3 1	1.375	-0.3	-15.4
N	AM INTL INC	6 3	3.125	-0.1	-3.8
Q	AST RESH INC	18 7	16.875	-0.1	-0.7
Q	AUTO TROL TECH CORP	6 3	2.563	0.0	0.0
Q	BANCTEC INC	20 11	17.75	0.3	1.4
Q	CIPHER DATA PRODS INC	10 4	8.125	0.0	0.0
A	COGNITRONICS CORP	6 3	5.375	-0.3	-4.4
Q	CONNER PERIPHERALS	20 7	18.75	-0.5	-2.6
A	DATAPRODUCTS CORP	18 6	8.125	0.8	11.4
A	DATARAM CORP	14 6	13.875	1.0	7.8
N	EASTMAN KODAK CO	52 37	38.125	0.1	0.3
N	E M C CORP MASS	7 3	6	-0.5	-8.4
Q	EMULEX CORP	13 6	5.625	-0.1	-2.2
Q	EVANS & SUTHERLAND	30 17	26.5	-1.5	-5.4
Q	IDOT CORP	3 1	1.75	0.0	0.0
Q	INTERLEAF INC	10 5	6	-0.1	-2.0
Q	KIMEGA CORP	4 2	3.813	0.1	1.7
Q	LEE DATA CORP	4 1	1.75	0.1	3.7
Q	MASSTOR SYS CORP	4 1	1.938	0.1	8.8
Q	MAXTOR CORP	14 7	11.75	-1.4	-10.5
Q	MICROPOLIS CORP	6 3	4.625	-0.8	-0.1
N	MINNESOTA MNG & MFG CO	85 66	83.625	-0.6	-0.7
Q	PERSONAL COMP PRODUCTS INC	6 4	4.063	0.0	0.0
Q	PRINTRONIX INC	13 7	13	0.4	3.2
N	QMS INC	16 7	13.625	-0.3	-4.4
Q	QUANTUM CORP	17 6	13.375	-0.6	-4.5
N	RECOGNITION EQUIP INC	13 6	6.25	-0.3	-4.5
Q	REXON INC	6 5	8.875	-0.4	-4.1
Q	SEAGATE TECHNOLOGY	20 10	15.125	-2.3	-12.8
N	STORAGE TECH CORP	25 6	22.25	2.9	14.8
Q	TANDON CORP	2 1	1.5	-0.2	-11.1
N	TEKTRONIX INC	24 13	13.5	0.1	0.8
Q	TELEVIDEO SYS INC	1 0	0.25	0.0	14.2
N	XEROX CORP	69 50	54.25	0.1	0.2
	Leasing Companies				
Q	AMPLICON INC	116 6	6.75	0.0	0.0
N	CAPITAL ASSOC INTNL INC	6 3	3.688	0.2	5.4
N	COMDISCO INC	34 22	27.25	-1.3	-4.8
Q	CONTINENTAL INFO SYS	3 0	0.281	0.0	0.0
Q	LDI CORPORATION	18 13	15.75	-0.3	-1.8
Q	PHOENIX AMERN INC	6 3	3.25	-0.4	-10.3
Q	SELECTERM INC	9 6	5.875	0.0	0.0

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Slump-lings

Losses and slight gains create mixed reactions on Wall Street

Mix one part gusto with 10 parts moderation, and you've got trading in the technology sector last week.

First, the action. Seller trampled seller in a mad dash Wednesday to shed more than 20 million shares of Oracle Systems Corp. after the company jolted investors with disappointing third-quarter earnings news. Oracle slumped to 18⅛ by Thursday, down 6¼.

After company President Richard Miller was named chairman and chief executive at Wang Laboratories, Inc., Wang's Class B stock dropped ¼ of a point to 5¼. Wang's B, which has traded as low as 3¾ this year, had been gradually rising in recent weeks. Cray Research, Inc. climbed 2½ points to 48⅛ after announcing that it will put its first small supercomputer on the market by mid-1991. Compaq Computer Corp. also moved 2½ points — but the wrong way, down to 96.

Investors gave AT&T some credit after hearing about its new charge card plan, sending shares up 1⅛ to 42¾.

Now for the moderation. Digital Equipment Corp. gained ¼ of a point to end at 78¼, while Hewlett-Packard Co. added ¼ to 46¾. IBM was up 1 to 106.

KIM S. NASH

NEWS SHORTS

Pentagon cedes to Commerce

The U.S. Department of Defense (DOD) last week said it will delegate to the U.S. Department of Commerce authority for issuing export licenses for computer equipment sold to the Soviet Union and East European countries. While the move will not eliminate the need for U.S. companies to obtain licenses, it will take DOD out of the review loop, Pentagon officials said.

New appeal on NASA contract

Computer Sciences Corp. (CSC) said last week it will ask the U.S. General Services Administration's Board of Contract Appeals to set aside a ruling by one of the board's judges that disqualified the company from the award of a $170 million contract from NASA. The judge ruled that CSC had deliberately understated its labor rates in its bid against incumbent Sterling Software, Inc. for the automated data processing support job.

New servers from Silicon Graphics

Silicon Graphics, Inc. reportedly will beef up the high end of its server line today with the introduction of a pair of machines capable of processing up to 200 million instructions per second. The 4D/300 series packs up to eight 33-MHz reduced instruction set computing processors with prices starting from $74,900 to $202,500. The Mountain View, Calif., firm recently zipped into the No. 4 spot on Dataquest, Inc.'s list of leaders in the supercomputer market through the aggressive marketing of what the research firm calls "project supercomputers," or computationally intensive machines designed for small groups of workers.

3Com adds links

3Com Corp. last week announced s 10BASE-T network adapter for the IBM Micro Channel Architecture (MCA) and a 10BASE-T twisted-pair module for the company's Multiconnect Multiport Repeater. The MCA adapter offers connectivity to Personal System/2 Models 50 through 80 and will be available at the end of the month for $495. The Multiconnect will interoperate with other Multiconnect modules supporting standard and thin coaxial cable, shielded and unshielded twisted-pair wiring, fiber-optic media, Arcnet and IBM Token-Ring and 3270 cables. It will be available next month for $595.

U.S. industry records deficit

The U.S. trade surplus in computer equipment and parts declined in 1989 from $5.4 billion to $2.1 billion, according to the Computer and Business Equipment Manufacturers Association. Data processing equipment, taken alone, showed the first deficit in the three decades figures have been kept. The information technology industry as a whole showed s deficit of $1.1 billion after a surplus of $656 million in 1988, CBEMA said.

Laptop-to-host card from NEC

NEC Technologies, Inc. last week introduced an expansion card for its Prospeed laptop computers that allows them to connect to IBM mainframes. The $899 Remote Synchronous Modem 3270 card uses Digital Communication Associates' Irma-remote Systems Network Architecture software. NEC already offers a 5250 remote synchronous modem card and a 3270 emulation adapter card. Separately, NEC added an Intel Corp. 80386SX chip-based machine to its Prospeed laptop line. The $5,998 Prospeed 386SX features 1M to 9M bytes of random-access memory, an IBM Video Graphics Array-resolution LCD screen and a 40M- or 100M-byte hard drive.

Microsoft enhances Mail

Microsoft Corp. in Redmond, Wash., announced the integration of voice-messaging capabilities into the Microsoft Mail package for Apple Appletalk networks. Mail is the first business application to incorporate sound recording, compression and playback functions. Microsoft also announced The Gateway for Applelink, s gateway designed to connect the Microsoft Mail user with the Applelink network system.

AT&T enters office automation ring

BY AMY CORTESE
CW STAFF

NEW YORK — AT&T Computer Systems last week announced an integrated set of Unix server-based software designed to automate the flow of work among office workers.

Dubbed Rhapsody, it consists of hardware, software, networking and professional services and will be generally available late in the third quarter, the firm said.

Analysts said that while AT&T may have taken s technological leap beyond IBM, Digital Equipment Corp. and other office system providers, it is not likely to grab market share away from them.

Rhapsody is a client/server-based system that builds on AT&T networking and electronic messaging systems and makes use of software developed by both AT&T and third parties.

Unix servers and Hewlett-Packard Co.'s New Wave object-oriented environment, which AT&T has extended to work with non-New Wave applications, are at the heart of the system. Additionally, AT&T is offering productivity tools from Microsoft Corp., Lotus Development Corp. and others.

Much of the work-flow capability that analysts said distinguished the AT&T offering comes from Workhorse, a program developed by s small Irish firm called Work-flow Automation Systems.

Critical component

Analysts said that this work-flow automation software could do for work groups what Lotus' 1-2-3 did for personal productivity. "Work-flow software will be a critical component of office systems in the 1990s," said Barbara Babcock, vice-president of office information systems at Gartner Group, Inc.

Workhorse automates many procedures, such as calling information from files, scheduling meetings and tracking project status. It is integrated with AT&T's PMX/Starmail electronic mail system.

While a handful of products today have some sort of work-flow capability, AT&T is the first major vendor, besides Unisys Corp., to announce a general-purpose system, analysts said. "IBM hasn't even touched this," said Judith Hurwitz, vice-president of Patricia Seybold's office computing group.

The Unix-based server initially will support MS-DOS-based Intel Corp. 80286 and 80386 machines, but AT&T promised a future version for Unix and OS/2.

While there are many products on the market that can automate sequential processes, true work-flow software can automate complex business procedures with concurrent processes, according to Babcock. On the other hand, specialized work-flow products have been available for some time.

Ken Traugot, vice-president and manager of strategic technology assessment at Citicorp's technology office in Santa Monica, Calif., a user of the Filenet work-flow software, has seen substantial increases in productivity, control and cost savings as a result. "Work-flow software has been s key differentiator for optical disc-based systems, and it may have the same impact on general office systems," he said.

A single 33-MHz 386-based server equipped with Rhapsody software and networking will cost $99,995. A single entry-level 286-based client configured with MS-Windows, Rhapsody client software and three software applications will cost $7,925.

Motorola

FROM PAGE 1

ruled that Hitachi's H8/532 microcontroller infringes on four Motorola patents.

Most observers agreed that the ruling could have dire consequences for both firms and will likely force them to quickly forge a compromise settlement.

"Both companies come out looking bad unless they do something in a hurry," said Drew Peck, an analyst at Donaldson, Lufkin & Jenrette in New York. "It's unimaginable to me that this thing could persist."

Manufacturers that rely on the Motorola chips are keeping their fingers crossed.

"We're taking it coolly," said a spokesman at Stratus Computer, Inc. in Marlboro, Mass., which is introducing a new generation of fault-tolerant machines, at least some of which will be based on the 030 chip.

"We have a sufficient number of 030 chips to carry us through June," said David Hayward at Stratus.

An Apple spokeswoman said the company is "confident the two parties will come to an agreement soon, and there will be no impact on us." She added that until such a decison is made, Apple has a "significant inventory" of its Macintosh line to satisfy customer needs.

The 68030, shipping in volume for more than a year, sold 1.1 million units worldwide in 1989, according to Dataquest, Inc., a market research firm in San Jose, Calif. That leaves customers using 68030-based systems from more than 30 vendors on uncertain ground. "We can't afford to get rid of our Macs," said Cindy Kile, head of the technical publishing department at Sierra Technology in Sacramento, Calif.

The university market, where Apple predominates, is also on guard. "Apple is 65% to 70% of our business, but I'm sure it's nothing they won't overcome," said Glenn Berger, assistant manager at the University of Rochester computer sales in New York.

Low demand

For Sun, however, the decision may be one more reason to deep-six its Motorola-based Sun 3/80 line in favor of the Sparcstation 1 model, which is based on Sun's reduced instruction set computing Scalable Processor Architecture chip. "Demand for Motorola systems is very, very low," a Sun spokeswoman said.

One Sun customer agreed that the decision could hasten his transition away from the Sun 3/60. "This certainly enforces our decision to switch over to the Sparcstation line," said Bill Tapley, a senior programmer at Lawrence Livermore National Laboratory in Livermore, Calif.

The ruling comes after a long legal slugfest in which the two giants accused each other of stealing technology. At the root of the dispute is a 1986 cross-licensing agreement in which the two firms allowed each to use some of the others' technology. Both Motorola and Hitachi subsequently charged each other with stepping over the borders of that agreement.

In the ruling, Bunton ordered Motorola to stop marketing or selling the 68030 for the duration of the infringed Hitachi patent and pay Hitachi $500,000 in damages. Hitachi officials were ordered to cease marketing and selling of the H8 microprocessor for the duration of the infringed Motorola patents and pay Motorola $1,901,460 in damages.

Although the Hitachi microprocessor is not as visible as the 68030, analysts said the size of its market is huge. Used largely as an embedded controller, the H8/532 "is used in all sorts of consumer products sold in millions of units, which is not the case in the 030. The ruling is as significant for Hitachi as it is for Motorola," Peck said. Hitachi said it is considering all options, including an appeal.

Until then, Motorola may be able to wrangle some back-door solutions to the problem, such as selling the chips abroad and having OEM customers import them back into the U.S., analysts said.

Computerworld Senior Writer Maryfran Johnson contributed to this report.

High-tech

FROM PAGE 1

cellular phone circuits, making theft of information undetectable."

Networks of all types, not just for computers, have proliferated out of control, creating "a lot of security problems" and augmenting the number of potential points of unauthorized entry into company computer systems, White said. "The networks are without end points, and most IS managers do not even know how extensive their networks really are," he added.

Many foreign competitors are also being aided by their nations' intelligence organizations in carrying out this electronic eavesdropping, according to Matchett, who previously worked for the National Security Agency on computer security issues. "They are actively participating in it; there is even tasking for certain information for their countries' businesses."

Calculating losses as a result of electronic industrial espionage is a difficult task because unauthorized access to databases is rarely discovered and there is no immediate evidence of theft, he said. However, Matchett said he believes that the losses may reach into the billions of dollars per year.

Investigating and prosecuting crimes that cross national, legal and cultural boundaries will also be difficult, if not impossible, said Raymond Humphrey, director of corporate security at Digital Equipment Corp.

"There are no walls around a hacker, who can conceivably start his or her activity in Australia and leap across national boundaries to the U.S.," Humphrey said.

Although computer hackers and others may become more adept at penetrating corporate computer systems, the majority of computer-related crimes will still be carried out by insiders, according to most security experts. If anything, insider attacks will increase, they said.

"The 16- to 17-year-old hacker of a few years ago is now an adult looking for a job and is getting hired," said John Venezia, a data security investigator at Electronic Data Systems Corp. Professional hackers working inside a corporation are able to identify weaknesses that outsiders could never expect to uncover, he said.

Adding to the problem is the fact that end users are becoming increasingly computer-literate, and few firms are laying down ground rules that regulate employee access to company systems from home or elsewhere.

"The problems are caused by nontechnical people making mistakes and insiders manipulating data for their personal benefit," said Robert Courtney, an independent computer security consultant. "The dollar damage by hackers compared to that caused by insiders is nothing."

He disagreed with the notion that corporate computer systems are becoming more vulnerable: "The way we're designing computer systems does not create any more opportunity."

Major corporations will also have to contend with attacks on their computer systems, data centers and networks by terrorists, special-interest groups and politically minded hackers, according to some experts.

Attacks on computer systems already account for some 60% of all terrorist attacks in world, said Martin Cetron, president of Forecasting International Ltd., a consulting firm based in Arlington, Va. In an article published in *The Futurist* last year, Cetron said 24 computer centers were bombed in West Germany in one year. Italy's Red Brigades and France's Action Directe have also targeted computer systems in Europe.

"It is only a matter of time before someone takes advantage of U.S. computer vulnerability," he said.

"It seems as though terrorists are tuning into the information age," said Steve Sawyer, cofounder of Sgsystems, Inc., an antivirus software publisher in San Francisco and co-host of a forum on The Well, a popular electronic bulletin board. "It is like planting a bomb," he said. "Although it is bloodless, it may have even more of an impact."

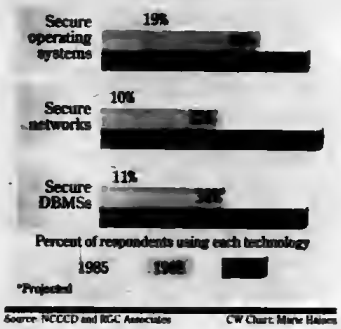
Security experts said they believe that special-interest groups out to stymie corporations whose businesses are thought to have a deleterious effect on the environment, for instance, will begin making computer systems the targets of their protests. "Instead of spiking trees, they are going to spike computer systems," Sawyer said.

Already, computer viruses and worms carrying political messages are popping up with alarming frequency. For example, the Fu Manchu virus discovered last year in the UK seeks out the names of certain politicians — such as Thatcher, Reagan and Botha — in word processing files and tacks on rude remarks about the political figures.

The worm known as Worms Against Nuclear Killers, or WANK, which was twice pumped into the National Aeronautics and Space Administration's largest space and earth science network last year, is believed to have been a protest against the launch of a space shuttle that was carrying a nuclear-powered space probe.

Weak points

Concern about security is on the rise, but many sensitive system areas remain unprotected



Source: NCCCD and RGC Associates — CW Chart: Marie Hansen

Ultrix upgrade to anchor DEC rollout

BY MAURA J. HARRINGTON
CW STAFF

The added capability of symmetrical multiprocessing in Digital Equipment Corp.'s latest reduced instruction set computing (RISC)-based Decstation 5000 series of workstations is a significant step toward the advancement of the company's Ultrix-based product line, which analysts concurred has thus far lagged behind IBM's RISC System/6000 workstation line.

Although analysts have not had a chance to examine the new workstation product line, they said an important aspect of the line, to be unveiled tomorrow in Palo Alto, Calif., is the symmetrical multiprocessing capability included in the new Ultrix Version 4 operating system, DEC's Unix-based operating system.

The Decstation 5000 workstation series will show several faces at its debut — from a basic desktop system adorned with various graphics options to a deskside server machine — but the core processing technology will be based on the Mips Computer Systems, Inc. R3000 chip. The new workstations will probably run at a clock speed of 33 MHz to achieve a compute speed of 24 million instructions per second, industry analysts said.

"The big thing with this announcement is not the hardware. The most significant part is Ultrix Version 4, which will support symmetrical multiprocessing," said Terry Shannon, an analyst at International Data Corp. in Framingham, Mass.

"For the first time [under Ultrix, DEC] will be able to support symmetrical multiprocessing. DEC is clearly intent on increasing its pressure in that market because it's the fastest growing market in the industry," said analyst Robert Herwick at Hambrecht & Quist, Inc., in New York. The symmetrical multiprocessing market is one of the few areas of technology that is still growing in double-digit numbers. The technology is needed because users have changed their manner of transaction processing, he added.

> "THE BIG thing with this announcement is not the hardware. The most significant part is Ultrix Version 4, which will support symmetrical multiprocessing."
>
> TERRY SHANNON
> IDC

"Increasingly, people are working in a more interactive way, thus the demand for higher transaction processing rates" and the need for symmetrical multiprocessing, Herwick said.

Symmetrical multiprocessing allows "all of the processors to share the burden, and that's really significant ... because it eliminates the bottlenecking that could occur on a large system," said Hank Walker, assistant director of the Computer Aided Design center at Carnegie Mellon University in Pittsburgh.

While the symmetrical multiprocessing feature is significant, Walker said the machine's two- and three-dimensional graphics capabilities are also significant.

Ultrix 4.0 also features C-2 level security, a federal standard set by the National Security Agency; and Ultrix/SQL, DEC's new relational database management system for Ultrix, modeled on Alameda, Calif.-based Ingres Corp.'s Ingres Release 6.2, said Mitch Bishop, Ingres' director of Unix product marketing.

Ultrix/SQL is a runtime relational database with an interactive SQL level of compatibility with DEC's VAX RDB/VMS database, which is the first step toward bidirectional VAX RDB/VMS and Ultrix/SQL data transfers, Shannon said.

Senior Writer Maryfran Johnson contributed to this report.

Commerce Department revokes Singapore ruling

BY DAVID A. LUDLUM
CW STAFF

WASHINGTON, D.C. — Reversing its preliminary finding, the U.S. Department of Commerce ruled last week that the government of Singapore did not subsidize development of a commercial software product.

However, the department's International Trade Administration (ITA) stuck by a precedent-setting decision in the earlier ruling that software on disk or tape can be subject to U.S. import duties — including software on a master disk.

After the first ruling, Singapore continued to argue that software on disk or tape should be considered a service rather than merchandise and therefore should not be subject to duties.

Adapso, the software trade association, made a last-minute request for the ITA to drop the case, fearing other countries could retaliate against U.S. import duties on software by imposing their own.

However, Adapso's action was not a factor in last week's ruling, said Frank Sailer, the Commerce Department's deputy assistant secretary for investigations. The proceeding concerned a computer-aided software engineering (CASE) product, and it was not clear that Adapso represents the CASE industry, Sailer said.

In addition, Index Technology Corp., a leading CASE vendor, urged caution but did not oppose the proceeding. "We were left with a lot of inconclusive information," Sailer said.

The ITA's final ruling overturned the decision it made in January, when it concluded that Singapore had subsidized development of Pose, a front-end CASE tool marketed in the U.S. by CSA, Inc. in Woodland Hills, N.J. The charge was brought by Visible Systems Corp., a CASE vendor in Waltham, Mass.

Both sides agreed on many of the facts: The Singapore government developed Pose; through bids, it chose CSA to market the product in exchange for payment of royalties; then it negotiated larger payments based on greater projected sales.

Managers at Visible Systems were disappointed with the finding that there was no subsidy but pleased with the conclusion that software can be considerd merchandise subject to import duties, said Richard Constantin, a spokesman for the company.

AN WANG 1920 - 1990

A quiet, private man, *the late Dr. An Wang often found himself in the spotlight. Clockwise from top: guiding the career of his son, Fred, to an ill-fated company president title; receiving an honorary degree from Harvard University; and joining in a political rally for the presidential campaign of Massachusetts Gov. Michael Dukakis.*

Photos: Rick Friedman/Black Star

Wang

FROM PAGE 1

"I just remember being completely fascinated and very much in awe of the man, sitting there drinking his Chinese tea and being very gracious," Cash said. "I think he was always behind products with people in mind vs. the high-tech, whizbang technology. We were very touched by him."

Although An Wang rarely seemed to have a direct effect on a company's purchasing decision, he was always a notable and welcome presence afterward, several longtime customers said.

"He was, of course, very responsible for so much of the innovation," said Jack Crawford, vice-president of information management at the Hartford Insurance Group in Hartford, Conn. "He didn't spend a lot of time with customers, but he made you feel comfortable that technology research and development was at the forefront of his company."

Clement Kichuk Jr., vice-president of Marketing Corporation of America in Westport, Conn., called Wang "the stereotypically great American success story."

"The doctor had an ability to take that giant step up into the stratosphere and look down," Kichuk said. "He was very farsighted."

Another longtime admirer was George DiNardo, executive vice-president of information management and research at Mellon Bank NA in Pittsburgh.

DiNardo remembered "quite a few breakfasts" spent chatting with An Wang during his visits to Pittsburgh. "It was always clear that he *was* Wang," DiNardo said. "When he started to withdraw from Wang, many of their problems began to emerge."

Yet Mellon Bank remains a "dedicated customer," he noted.

"He was certainly a brilliant individual who took ideas and implemented them in a fashion that set an industry trend," DiNardo said. "As a shy and retiring individual, he was still able to command a respect equivalent to that given the deity. His people really worshiped the ground he walked on."

> "THE DOCTOR had an ability to take that giant step up into the stratosphere and look down."
>
> CLEMENT KICHUK JR.
> MARKETING CORPORATION OF AMERICA

Religious terms such as "reverence" and "worship" popped up constantly when Wang customers described the way Wang's employees felt about him.

"When the Wang people called on us and talked about 'The Doctor,' they said it in an almost religious sense," agreed Bill McDevitt, general director of administrative services at John Hancock Mutual Life Insurance Co. "Where other people might say Buddha or Jesus in a certain tone of voice, that was the way his people would say The Doctor. Customers didn't question that."

A lifetime of accomplishment

BY COMPUTERWORLD STAFF

In his last days, An Wang spent much of his time talking with his family, often through brief, jotted notes. "I know he would have wanted me to share some of these thoughts with you," his eldest son Frederick Wang told those who packed Harvard University's Memorial Church last week to honor "The Doctor" and to remember, celebrate and mourn.

The words he read did not sound like those of a legendary computer entrepreneur, an industry titan, a venerated philanthropist — all of which The Doctor, who died of cancer on March 24, indisputedly was. But to those who knew the man, the words surely sounded just like An Wang.

"Always be humble," one of the messages said. "Remember — the world does not need us, but we need the world," said another. And another: "I have always tried to do my best."

Most people would have given him a less modest epitaph; last week, many did.

"What can you say? He was a great, great man," said Chris Christiansen, an analyst at Meta Group, Inc. in Westport, Conn. "He just about created office automation."

"He was a brilliant man, very down-to-earth and humble," said Edward Murphy, a former Wang salesman in Atlanta.

Hard times have hit Wang Laboratories, Inc., the company that An Wang founded four decades ago and took to the forefront of the computer industry. Many industry observers said they believe that the firm will never regain its former heights as an independent company. Some, in fact, said they thought that An Wang's inability to change the ways in which he viewed technology and business was, in recent years, a factor that jeopardized the firm.

It was not until last year, when the company was on the brink of insolvency, that Wang finally capitulated to persistent outside demands to bring in a professional manager and hired Richard Miller to replace his son, Frederick, as president. Last week, Miller was named chairman and chief executive officer, titles the Doctor had held until the end (see story page 97).

Shining star

None of this, however, seemed to tarnish An Wang himself, even in the eyes of those who were sideswiped by the company's falling fortunes.

Last week, Murphy said, "a number of my former customers called me to offer condolences and talk about The Doctor. Some of them had stopped buying Wang products, but on a personal level they were sad at his loss."

An Wang was born in Shanghai in 1920, the eldest of five children of a middle-class family. He distinguished himself early in the sciences and, at the age of 16, entered prestigious Chaio Tung University.

In 1945, a U.S.-initiated program to bring highly trained engineers to the states landed the 25-year-old Wang — who placed second in the competitive exam that determined acceptance to the program — in Newport News, Va. Three months later, he was at Harvard University, enrolled as a master's degree candidate; 16 months after acceptance at Harvard, Wang graduated with a Ph.D. in applied physics.

His list of accomplishments established his name in the pantheons of the computer industry and U.S. entrepreneurial legend.

- In 1948, he helped develop magnetic core memory — essential to the development of modern computers. IBM later bought Wang's core memory patents in the shadow of court litigation.
- In 1951, he founded Wang Laboratories on a shoestring — a Boston University art student signed on as its first employee at 55 cents per hour — and grew it into a public company with nine-figure earnings, revenue stated in billions and hundreds of thousands of employees worldwide.
- He was among the pioneers who developed the desktop calculator industry in the 1960s, the computer-based word processor in the 1970s and the minicomputer.

An Wang received many awards and degrees, including 23 honorary degrees; the Medal of Liberty, awarded by former President Ronald Reagan in 1986; and enshrinement in Halls of Fame erected by journals and universities. His personal wealth has been estimated at $1.5 billion. He also gave liberally: $4 million to create Boston's premier center for the performing arts; $4 million to Harvard; $6 million to establish the Wang Institute, which awards master's degrees in software engineering; and $4 million to build an outpatient clinic at Massachusetts General Hospital — the hospital in which he died.

1-2-3/G: A 'qualified' success

BY PATRICIA KEEFE
CW STAFF

CAMBRIDGE, Mass. — The long-awaited delivery last week of 1-2-3/G, Lotus Development Corp.'s OS/2 spreadsheet, garnered rave reviews tinged with notes of caution.

According to beta-test site users, 1-2-3/G technically leapfrogs rival Excel from Microsoft Corp. and far exceeds what many thought Lotus could do. "It is virtually everything I have been waiting for," said Jack McGrath, publisher of a 1-2-3 newsletter.

Among the $695 package's most lauded features is that 1-2-3/G retains user investment in "finger memory," right down to first-letter commands and slash file/retrieve. Also cited were the graphical interface, enhanced graphics, three-dimensional capabilities, Solver for "what-if" analysis, dialog boxes, cascading menus and multiple windowing.

It is expected to top the buy lists of OS/2 aficionados. For one, the Canadian National Railroad (CNR) has seized upon 1-2-3/G as the lightning rod that will push its DOS users to move over to OS/2. But despite these plaudits, migration to 1-2-3/G could be stymied by a number of factors:

- The lack of a 32-bit version of OS/2, slated for delivery early to mid-1991.
- Huge memory requirements — at least 5M bytes to run OS/2 and 1-2-3/G. This is expected to wreak havoc with users of IBM's most popular Personal System/2, the Model 55SX.
- Migration costs could hit $5,000 per desktop.

Furthermore, Lotus may find itself caught in the classic marketing bind, in which users stop buying the old product while waiting for the new one. But in this case, some users who might have migrated to 3.0 have hinted that they might skip that generation, moving 1-2-3 Release 2.2 users en masse up to 1-2-3/G *after* OS/2 Version 2.0 ships.

"In a lot of cases, we'll go right [from 2.2] to G," said Lucille Normandeau, CNR's senior systems development officer.

Perhaps of more importance to Lotus, the wait for OS/2-based 2.0 could dampen 1-2-3/G sales. It seems that users have not been waiting as much for OS/2 applications as they have been for a 32-bit version of OS/2, which many consider to be the "real" OS/2.

1-2-3/G spreadsheet *allows users to exchange live data*

The problem with the current 16-bit versions of OS/2 is that limited DOS compatibility forces users to abandon their desktop investments. But the greatly improved DOS support under Version 2.0 will allow users to bring in the new without sacrificing the old, explained Sheldon Laube, chief information officer at Price Waterhouse and a 1-2-3/G beta-test site user.

"We'll wait for 2.0 before we go to G in force," said Jude Gartland, a senior vice-president at Shearson Lehman Hutton, Inc.

Moreover, some 1-2-3 users find the heavy memory requirements of 1-2-3/G a bit hard to swallow. The average personal computer today ships with 1M byte of memory. At 5M bytes a pop, 1-2-3/G sounds enough like a "resource hog" to scare off Ron Meyers, a department manager at Garriott Fluid Systems, a division of Allied Signals.

Gartland has more than 400 Intel Corp. 80286 chip users. He estimated a cost of roughly $5,000 per desktop to migrate to OS/2 2.0, which requires an 80386 chip. It will not stop him from eventually migrating his users to OS/2 or 1-2-3/G, but it could slow things down.

1-2-3/G's overhead may also serve to magnify the limited expandability of IBM's most popular PS/2 Model, the 55SX. It has only three slots, one of which is often taken up by a network adapter, and the motherboard will only support up to 4M bytes of memory. So users will be forced to either trade up or squander a precious slot on add-in memory. IBM could alleviate this with 4M-byte computer-integrated manufacturing chips, Laube said.

SQL Server tie-ins may ease data access woes

BY PATRICIA KEEFE
CW STAFF

SAN FRANCISCO — Lotus Development Corp. last week delivered two drivers said to provide 1-2-3 spreadsheet users with faster, easier access to data residing in the Microsoft Corp./Sybase, Inc. SQL Server.

Currently, 1-2-3 users have to jump through hoops, spending hours, even days, to access data located in other databases.

"Being able to access a database wherever from *within* the spreadsheet is really powerful. Getting data off the mainframe now is often an exercise in futility," said Sheldon Laube, chief information officer at Price Waterhouse.

The Datalens driver for SQL Server and a new add-in product called Lotus@SQL both cost $75 and link 1-2-3 Releases 2.01, 2.2, 3.0 and G, which also shipped last week to SQL Server databases.

The introductions, which are based on Lotus' Datalens technology, will be embedded in all Lotus products. They are the first in a series expected from Lotus and a number of database vendors.

> CURRENTLY, 1-2-3 USERS have to jump through hoops to access data located in other databases.

According to Christine Noonan, general manager of 1-2-3 Release 3.0, Lotus already offers Datalens drivers Ashton-Tate Corp.'s Dbase III, Digital Equipment Corp.'s VAX-based RDB and IBM's host-based DB2 and SQL/DS.

Noonan said she is hoping the Lotus unveiling will trigger other announcements. "There are at least 12 other drivers in the hopper," she said.

Beta-test user Softport Systems, Inc., a New York-based developer primarily serving financial services firms, was pushed into the technology by a large user, a bank that wanted to enable its users to respond to management's need for quick presentations of various numbers.

The Canadian National Railroad (CNR) needs to more easily extract data from its SQL Server databases, said beta-test user Lucille Normandeau, a senior systems development officer in CNR's accounting department. The SQL Datalens driver ties into plans to use 1-2-3/G to build an SQL-Server-based system, she added.

Early bird Sun version seen easing PC clutter

BY PATRICIA KEEFE
CW STAFF

CAMBRIDGE, Mass. — Amid the swirl of product announcements emanating from Lotus Development Corp. last week, was the news that 1-2-3 for Sun Microsystems, Inc. computers will ship almost three months early.

In addition, Lotus announced a service and support program for Sun users called the Lotus Service Plan to supplement the three months of free telephone support available to all registered 1-2-3 for Sun users. Pricing for the service ranges from $75 to $450 annually.

Escaping the PCs

Like the rest of Lotus' multiplatform spreadsheet, 1-2-3 for Sun is based on 1-2-3 Release 3.0. It supports three Sun hardware platforms: the Sparcstation 1, the Motorola Corp.-based Sun-3 line and the Intel Corp.-based Sun 386i line.

Although Lotus is anchored on DOS personal computers, Sun users such as Tektronix, Inc. in Beaverton, Ore., see 1-2-3 for Sun as a way to eliminate the PCs now marring a landscape of Sun desktops.

"We're a big Sun house, and we'd like to stick with one workstation per user and get rid of these PCs," said computer-aided design (CAD) support manager Bart Welling.

"It's nice to see some [office automation] applications on Sun," he added, explaining that he now needs a Sun box and an Apple Computer, Inc. Macintosh to use CAD programs, spreadsheets and word processing packages.

"With popular applications like 1-2-3 moving onto Sun, business users get the performance advantages of a Unix workstation along with the familiar software they use every day," added Ed Zander, Sun's vice-president of corporate marketing.

"We do a lot of database things with building materials, quality data and management of OA functions that we need a spreadsheet for," Welling said.

When 1-2-3 for Sun arrives on April 9, Welling will be able to purchase one of three levels of support under the Lotus service plan.

Gold support provides 1-2-3 for Sun Tech Notes, which is a quarterly publication that addresses technical issues and questions; Prompt, one year of toll-free telephone support; as well as upgrades, automatic notification and free shipment of all new product line releases and revisions. Silver support is reduced to Tech Notes and Prompt, while Bronze is limited to Tech Notes.

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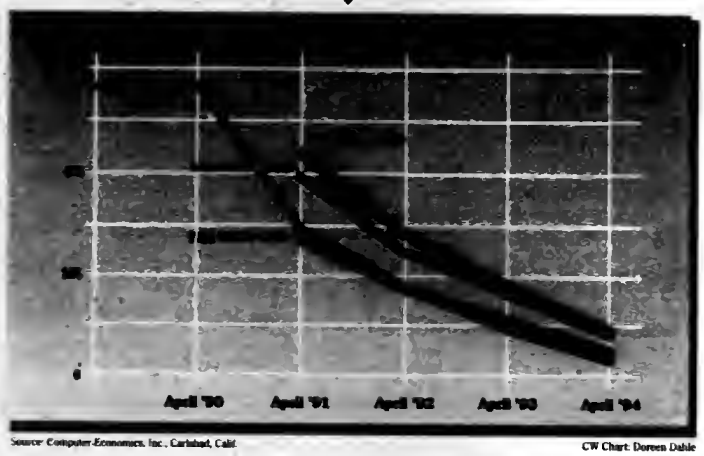
TRENDS

DEC Processors

Estimated residual values of selected DEC processors supplied by Computer Economics, Inc.

VAX 6000-310	$184	—	$49.1	$31.1	$19.5	$9.9
VAX 6000-430	$489	—	$210.2	$134.0	$83.8	$44.0
VAX 6000-450	$700	—	$308.7	$195.3	$122.5	$65.8
Microvax 3500	$77.2	$44.0	$22.5	$13.1	$6.9	$2.6
Microvax 3900	$120.2	—	$47.1	$28.8	$18.6	$10.0
Vaxstation 3100	$30.1	—	$9.0	$5.5	$2.9	$1.1

Putting pressure on the current Microvaxes and Vaxstations will be the tentative midyear announcements of new systems in each class.



Source: Computer Economics, Inc., Carlsbad, Calif.

CW Chart: Doreen Dahle

NEXT WEEK

Since automating Lithonia Lighting's payroll a quarter of a century ago, **Charles Darnell** has taken the Georgia-based lighting fixture firm to the leading edge of strategic business and information integration. A colorful personality, who combines down-home humor and business acumen, Darnell is the subject of a profile in Manager's Journal.

Chuck Rogers

There are lots of theories about the costs and benefits of computer-aided software engineering, but hard evidence is scarce. Buyers' Scorecard provides some firsthand insight with detailed user ratings of top design and analysis tools. Product Spotlight will also take a peek at how software vendors use CASE to develop their products.

INSIDE LINES

It's tough to cut the cord

Baxter International information systems chief Michael Heschel's move to Security Pacific Automation (see story page 1) was not the first time he has left Baxter for a banking job. At one point after the Baxter-American Hospital Supply merger in 1985, Heschel left for an IS position at Continental Bank — for about two weeks. Baxter successfully wooed him back. One analyst's response to the Security Pacific announcement was, "Is he really gone for good this time?" There seems little doubt that the answer is yes.

Now you see it, now you don't

For a short while, we're told, a ZIP file on Compuserve's Netwire forum included information about six new versions of the Netware DOS Shell, for real memory, extended memory and expanded memory, as well as a rewritten version of IPX. The top-secret electronic briefing indicated the software is currently in beta testing and scheduled for second-quarter release. Capabilities reportedly include displaying of valid hardware options and loading an alternate hardware option, as well as deconfiguring on the fly to test various hardware configurations without delinking the hardware shell. The ZIP file was apparently yanked quickly when word got out.

Through a looking glass — darkly

Windows 3.0 will not ship in April, and it's not going to ship during the first two weeks of May. The earliest Microsoft could manage to aim for was May 22. "Believe me, Gates will fall on a sword if they can't [deliver by then]," one beta-test user said. "They are under incredible pressure from users to get this product out the door," he added. Incidentally, a confident Bill Gates told FOSE attendees two weeks ago that more than half of all DOS users would move to Windows this year — which would add a few million to the bottom line.

Et tu, Willie?

A source with hooks into IBM claims that managers in Austin, Texas, were overheard complaining about their return on the $18 million they've invested in OS/2 advertising and marketing. Three years later, OS/2 has attained at best a 2% market share. But if you think IBM is ticked, imagine how Lotus feels. It has pumped $40 million into OS/2 development efforts and less than a month after 1-2-3/G, its first OS/2 application, ships, Microsoft will roll out Windows 3.0.

Coincidental tourist?

Oracle was to pounce on East Coast editors with a special preview of its computer-aided software engineering for OS/2 tool kit last month. At the last minute, the press tour was canceled — and put off until May. Sources inside Oracle said the product is ready and was slated to go into beta testing in late March. The sources said Oracle executives would prefer to have a shorter time between product announcement and shipment in June. In light of last week's announcement that profits had all but dried up, one has to wonder if perhaps the real reason has to do with a serious look at the expense side of the ledger.

Mediator needed

Compaq is bending over backward to bite at the thorn in its high-end server hide — namely Netframe. According to dealer and user sources, Compaq has swooped in on at least three customers considering Netframe purchases and handed them Systempro evaluation units free of charge. How these tactics will go over at Businessland — which sells both machines — remains to be seen.

As an IS consultant for Ernst & Young was warning IS security professionals recently about the security implications of tying computers into data, voice and other networks, other Ernst & Young consultants were handing out business cards listing work, home, digital pager, cellular and fax machine telephone numbers. Well, if they're not worried, neither are we. News Editor Pete Bartolik et al are vulnerable to communications via phone (800-343-6474), fax (508-875-8931) and MCI Mail (address: COMPUTERWORLD*).*

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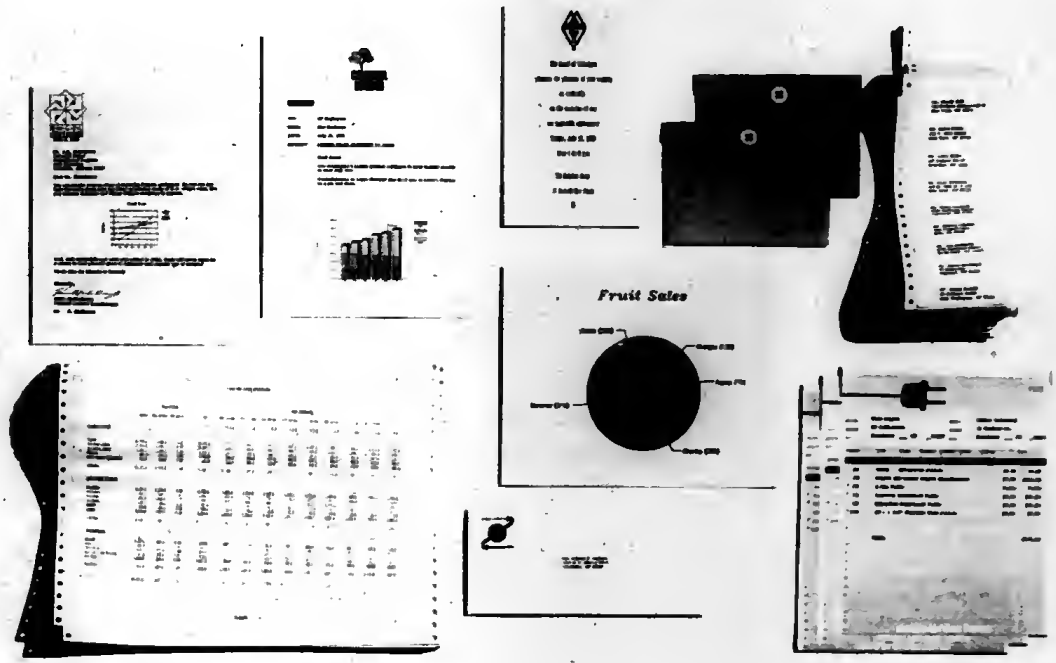

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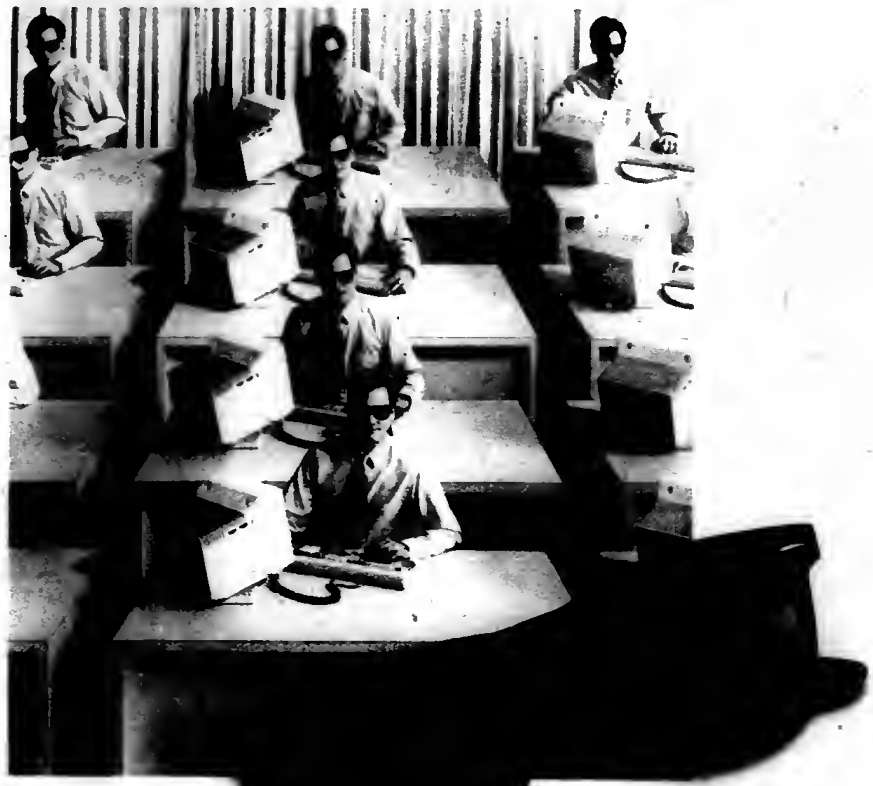

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